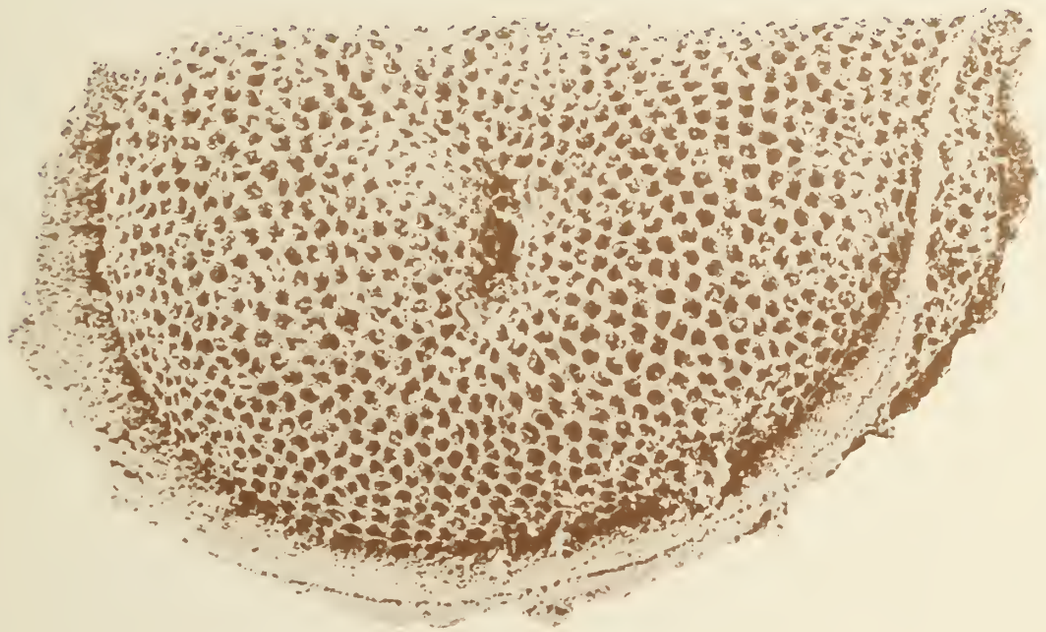
A Stereo-Atlas of Ostracod Shells

edited by J. Athersuch, D. J. Horne, D. J. Siveter,
and J. E. Whittaker



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Instructions to Authors

Contributions illustrated by scanning electron micrographs of Ostracoda in stereo-pairs are invited. Format should follow the style set by the papers in this issue. Descriptive matter apart from illustrations should be cut to a minimum; preferably each plate should be accompanied by only one page of text. Blanks to aid in mounting figures for plates may be obtained from any one of the Editors or Editorial Board. Completed papers should be sent to one of the Editors. All contributions submitted for possible publication in the *Stereo-Atlas of Ostracod Shells* are reviewed by an appropriate international specialist.

The front cover shows a male left valve (upper) and a female right valve (lower) of *Eurybolbina bispinata* (Harris, 1957) from the middle Ordovician Edinburg Formation of Virginia, U.S.A. British Museum (Natural History), nos. OS14028 and OS13536 respectively. Photographed by M. Williams and C. Giles Miller.

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Contents

595.336.11 (113.331) (575.1 : 161.66.40): 551.351

ON *ASIACICATRICULA VARIA* (MICHAILOVA)

by David J. Siveter, Elena D. Michailova & Anna F. Abushik
(University of Leicester, England; Institute of Mining, St. Petersburg, Russia; All-Russian Geological Research Institute, St. Petersburg)

Genus *Asiacicatricula* gen. nov.
Type-species: *Saccarchites varius* Michailova, 1971

Derivation of name: Latin *Asia* + *cicatricula*, feminine diminutive of "scar"; referring to its geographical occurrence and dolonoid scar. Gender: feminine.

Diagnosis: Craspedobolbinine with obsolete lobation; lateral surface of valves more or less gently convex overall except for flattened area adjacent to anterior cardinal corner. Velum seemingly obsolete; position represented merely by a bend at margins of lobal area. Marginal ridge narrow, rounded at edge, occurs between cardinal corners; separated from lobal area by narrow groove. Crumina elongate, primarily anteroventral, almost completely assimilated within domicilium, hangs just below ventral margin of valve in lateral view; dolonoid scar well developed, long, straight. Weakly developed tubercles irregularly scattered over valve surface; crumina smooth.

Remarks: The beyrichiacean Family Craspedobolbinidae Martinsson, 1962 embraces those species which primarily have tubular structures in the velum (occasionally they may be reduced) and a crumina which originates by invasion of the velar tubules, thus leaving traces of a dolonoid pouch closing mechanism in the form a dolonoid scar (Craspedobolbininae) or a velar edge deflection on the crumina (Amphitoxotidinae). *Saccarchites* lacks a dolonoid scar (Martinsson 1963, *op. cit.*, 52). The typical craspedobolbinine dolonoid scar in *Asiacicatricula* (Pl. **20**, 64, figs. 3, 4; Pl. **20**, 66, fig. 4) not only clearly indicates its taxonomic affinity but it also implies that the homalogue to the (obsolete) velum must be the bend forming the margin to the lobes in lateral view and that the uninterrupted ridge below the crumina must, therefore, be interpreted as a marginal ridge. The alternative explanation (i.e. that the "marginal ridge" is really the velum) would imply that a dolonoid scar could develop as a result of metamorphosis of part of the lobal area, a phenomenon counter to all known data relating to the formation of the crumina in the Beyrichiacea.

Explanation of Plate 20, 64

Figs. 1-3, ♀ RV (**203/267**, 2300 μm long): fig. 1, ant.; fig. 2, ext. lat.; fig. 3, vent. Figs. 4, 5, ♀ RV (**204/267**, 2250 μm long): fig. 4, obl. vent.; fig. 5, ext. lat.
Scale A (500 μm; ×22), figs. 1-3; scale B (500 μm; ×22), figs. 4, 5.

Thus, *Asiacicatricula* differs fundamentally from other members of the family in that it lacks a velum as such and it has a crumina which is almost completely assimilated within the domicilium.

All beyrichiacean subfamilies show a simplification of the beyrichiacean carapace (e.g. obsoletion of the lobes and a reduction of the velum) in their advanced stock (e.g. Martinsson, A., 1962, 1963, *Bull. geol. Instn Univ. Uppsala*, **41**, 1-369 & **42**, 1-63 respectively). This trend is clearly confirmed herein in *Asiacicatricula*, a member of the most primitive subfamily. The simplified, "advanced" beyrichiaceans are often of upper Palaeozoic age and their distinction, if any, from taxa that have traditionally been referred to as Paraparchitacea (*sensu* Scott, H., 1961, *Treatise on Invertebrate Paleontology*, Univ. Kansas Press) and Aparchitacea (e.g. *sensu* Rozhdestvenkaja, A.A., 1972, *Ostracodes from the Upper Devonian of Bashkiria*, Acad. Nauk, S.S.S.R., Bashkirian Fil. Inst. Geol., 194pp) is difficult and needs to be resolved (e.g. see Becker, G. *et al.* 1974, *Meded. Rijks. geol. Diest.* (N.S.), **25**, 19; Abushik, A.F., 1990, *In:* Abushik, A.F. *et al.*, *Practical Manual on microfauna of U.S.S.R.*, **4**, *Palaeozoic Ostracoda*, 103. Min. Geol. U.S.S.R. All-Union Geol. Res. Instit. Nedra, Leningrad).

Asiacicatricula varia (Michailova, 1971)

1971 *Saccarchites varius* sp. nov., E.D. Michailova, *Sci. Notes Instit. Mines Leningrad*, **59** (2), 123, pl. 1, figs. 1-4, pl. 3, fig. 4.

Holotype: Museum collections, Institute of Mines, St Petersburg, Russia, no. **3/267**; female right valve.

Type locality: About 200 m NW of Kanda village, Merishkor Mountain, S slope of N Nuratau Ridge, Uzbekistan, central Asia; lat. 40°30′N, long. 66°45′E. Hjdynsai Beds, Merishkor Horizon, upper part of Wenlock Series, Silurian.

Figured specimens: Museum collections, Institute of Mines, St. Petersburg, nos. **200/267** (tecnomorphic LV: Pl. **20**, 66, fig. 5), **201/267** (tecnomorphic LV: Pl. **20**, 66, fig. 6), **202/267** (♂ RV: Pl. 20, 66, figs. 1-3), **203/267** (♀ RV: Pl. **20**, 64, figs. 1-3, Pl. **20**, 66, fig. 4), **204/267** (♀ RV: Pl. **20**, 64, figs. 4, 5). Specimen **202/267** is from sample 109/9; all of the other figured valves are from sample 106/5. All from the type section; collected by Michailova.

Diagnosis: As for the genus, which is monotypic.

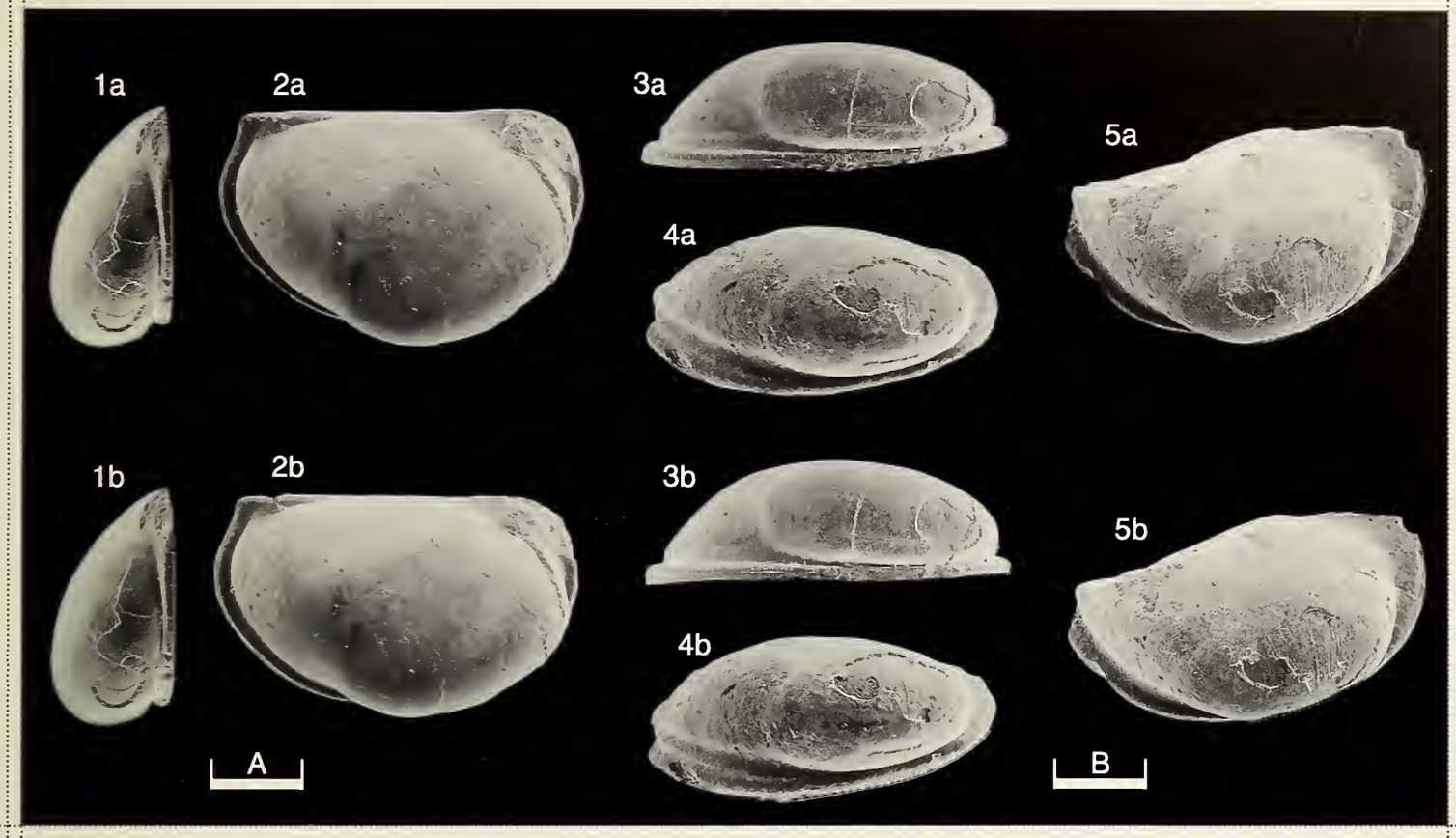
Remarks: In the central lateral part of the lobal area a small, smooth, ovoid spot is very faintly discernable in some specimens (Pl. **20**, 64, fig. 2, Pl. **20**, 66, fig. 1). This may represent an adductorial muscle spot, a feature known from several beyrichiaceans such as *Saccarchites* Swartz & Whitmore, 1956, *Myomphalus* Swartz & Whitmore, 1956, and *Bolbineossia* Kesling *et al.*, 1958.

Distribution: Hjdynsai Beds and their lateral equivalents, Wenlock Series, Silurian, Uzbekistan, central Asia. Three localities near Kanda (see type locality); one locality 1 km downstream from Matcha village, left bank of River Isfara, N slope of Turkistan Range; one locality in the Kyzyl-Kum Hills, Tamdytau Range.

Acknowledgement: The Royal Society and NATO are thanked for their support.

Explanation of Plate 20, 66

Figs. 1-3, ♂ RV (**202/267**, 2500 μm long): fig. 1, ext. lat.; fig. 2, post.; fig. 3, vent. Fig. 4. ♀ RV, obl. vent. detail of crumina showing dolonoid scar (**203/267**). Fig. 5, tecnomorphic LV, ext. lat. (**200/267**, 1700 μm long). Fig. 6, tecnomorphic LV, ext. lat. (**201/267**, 1250 μm long).
Scale A (500 μm; ×20), figs. 1-3; scale B (100 μm; ×65), fig. 4; scale C (300 μm; ×25), fig. 5; scale D (300 μm; ×28), fig. 6.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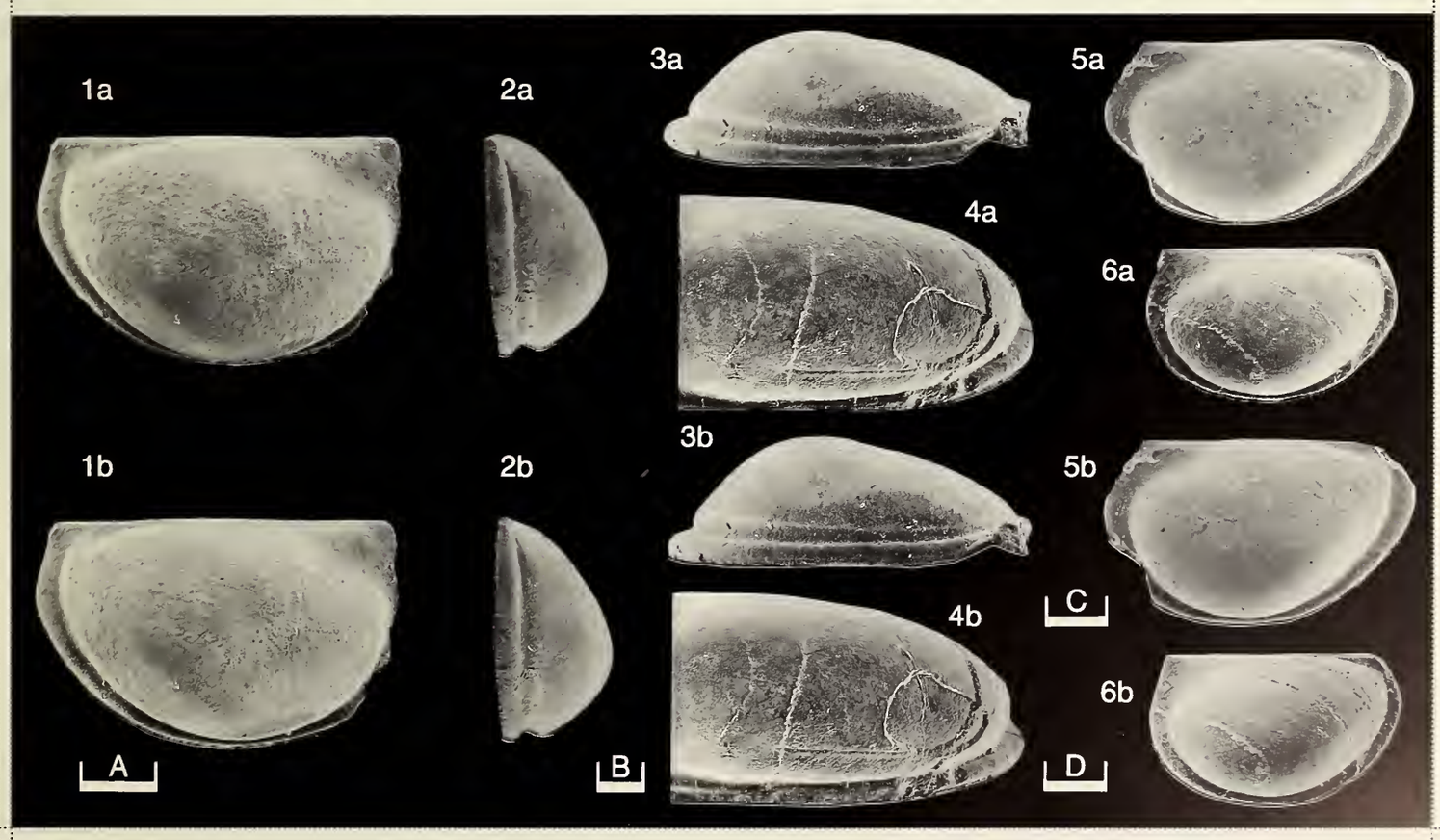
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595.336.11 (113.333) (575.1 : 161.68.39): 551.351

ON *MALGUZARIA SARVI* MICHAILOVA

by David J. Siveter, Elena D. Michailova & Anna F. Abushik
(University of Leicester, England; Institute of Mining, St. Petersburg, Russia; All-Russian Geological Research Institute, St. Petersburg)

Genus *MALGUZARIA* Michailova, 1972
Type-species (by original designation): *Malguzaria sarvi* Michailova, 1972

Diagnosis: Beyrichiacea having both torus and edge of velum as straight, parallel ridges across to anterior part of crumina. Three well developed lobes; syllobium divided dorsally by curved sulcule, also has a narrow, shallow sulcus parallel and near to its posterior margin. Lobal area and crumina have fine striation/reticulo-striation; lateral part of crumina also has *c.*20 short, narrow ridges. Supersulcal tubercle present, above preadductorial node. Tecnomorphs have anteroventral pit/depression. Velum appears merely as right-angle bend between lobal area and adventral parts of valve. Marginal area wide, flange-like, in lateral view.

Remarks: Michailova (1972) placed this genus in the subfamily Amphitoxotidinae, but the Russian *Practical Manual on Microfauna* (Abushik, 1990) questioned such an assignment. The subfamilial/familial assignment of *Malguzaria* within the superfamily Beyrichiacea is, indeed, difficult to resolve.

Anteroventral depressions are prominent in both amphitoxotidines (Craspedobolbinidae) and beyrichiines (Beyrichiidae). Indeed, in having a marked anteroventral depression, reticulo-striate ornament, and (two) ridges over the crumina *Malguzaria* recalls many amphitoxotidine genera such as *Huntonella* Lundin, 1968, *Sarmatotoxotis* Siveter, 1980 and *Hogburgiella* and *Lophoctenella* (both Martinsson, 1962). However, *Malguzaria* differs fundamentally from craspedobolbinids in lacking a well developed, tubulous velum. This difference is based on our interpretation of the lateroventral bend (i.e. that bend of the shell between the latero-lobal and contiguous adventral surfaces) and the ventrally adjacent ridge (Pl. **20**, 68, figs. 4, 5), both of which cross the crumina, as homologues of the velum and torus of other beyrichiaceans. This homology implies that the relatively wide flange which flanks the lobal area is a marginal flange, not a velum.

Explanation of Plate 20, 68

Figs. 1–6, ♂ RV (**50/268**; 1080 μm long): fig. 1, ant.; fig. 2, ext. lat.; fig. 3, post.; fig. 4, obl. vent.; fig. 5, vent.; fig. 6, ornament on syllobium.

Scale A (250 μm; ×45), figs. 1–5; scale B (50 μm; ×175), fig. 6.

The marginal flange and type of ornament of *Malguzaria* is more akin to similar features in various "atypical beyrichiids" (see A. Martinsson, *Bull. geol. Instn Univ. Uppsala* **41**, 347, 1962 & **42**, 19, 1963 respectively; and J. Berdan, *Prof. Pap. U.S. geol. Surv.* **730**, 24–26, 1972), such as *Psuedobeyrichia* Swartz & Whitmore, 1956 and *Bingeria* Martinsson, 1962. Those groups of beyrichiid-like forms which lack any kind of velar ridge or velar bend but which have a flange-like marginal structure were distinguished by Abushik (*In:* Abushik, A.F., Gusseva, E.A. & Zanina, I.E. *Palaeozoic ostracodes from key sections in the European part of the U.S.S.R.*, 81, 1971, Nauka, Moscow) as the family Wellerellidae. Pending a thorough first-hand revision of such forms, many of which are North American genera, at present we prefer not to assign *Malguzaria* to a beyrichiacean higher taxon.

Malguzaria sarvi Michailova, 1972

1972 *Malguzaria sarvi* sp. nov., E.D. Michailova, *Notes Instit. Mines Leningrad*, **63** (2), 34, pl. 1, figs. 1–3.
1981 *Malguzaria sarvi* Michailova; E.D. Michailova, *Sci. Notes All-Union Paleont. Soc.*, **24**, 129, fig. 2, 130, fig. 3.
1990 *Malguzaria sarvi* Michailova; A.F. Abushik, *In:* A.F. Abushik *et al.*, *Practical Manual on microfauna of U.S.S.R.*, **4**, *Palaeozoic Ostracoda*, 88, pl. 27, figs. 6–8. Ministry Geol. U.S.S.R. All-Union Geol. Res. Instit. Nedra, Leningrad.

Holotype: Museum collections, Institute of Mines, St. Petersburg, Russia, no. **5/268**; female carapace.

Type locality: Section in left bank of the Ettkitchu River, 0.5 km upstream from Myk village, Malguzar Range, South Tien-Shan, Uzbekistan, central Asia; lat. 39°45′N, long, 68°30′E. Isfara horizon, Prídolí Series, Upper Silurian.

Figured specimens: Museum collections, Institute of Mines, St Petersburg, nos. **50/268** (♂ RV: Pl. **20**, 68, figs. 1–6), **51/268** (♀ RV: Pl. **20**, 70, figs. 4, 6), **52/268** (♀ RV: Pl. **20**, 70, figs. 1–3, 5), **53/268** (♀ cara. crumina only: Pl. **20**, 70, fig. 8), **54/268** (tecnomorphic LV: Pl. **20**, 70, fig. 7). All from the type section; collected by Michailova.

Diagnosis: As for the genus, which is monotypic.

Remarks: The anteroventral depression of *M. sarvi* undergoes a marked ontogenetic transformation and in all but the smallest tecnomorphs its morphology is unlike any other species within the Beyrichiacea. In adult tecnomorphs it forms a shallow pit actually within the anteroventral lobal area (Pl. **20**, 68, figs. 1, 2, 4, 5). In smaller tecnomorphs it is a relatively deeper, more prominent, but still enclosed depression (Pl. **20**, 70, fig. 7). In the smallest juveniles examined (two valves in Michailova coll., Inst. Mines, St. Petersburg; not figured) this depression is positioned at the anteroventral margin of the lobal area and (typical of all other beyrichiaceans having this feature) its anteroventral part is not enclosed by the lobal area.

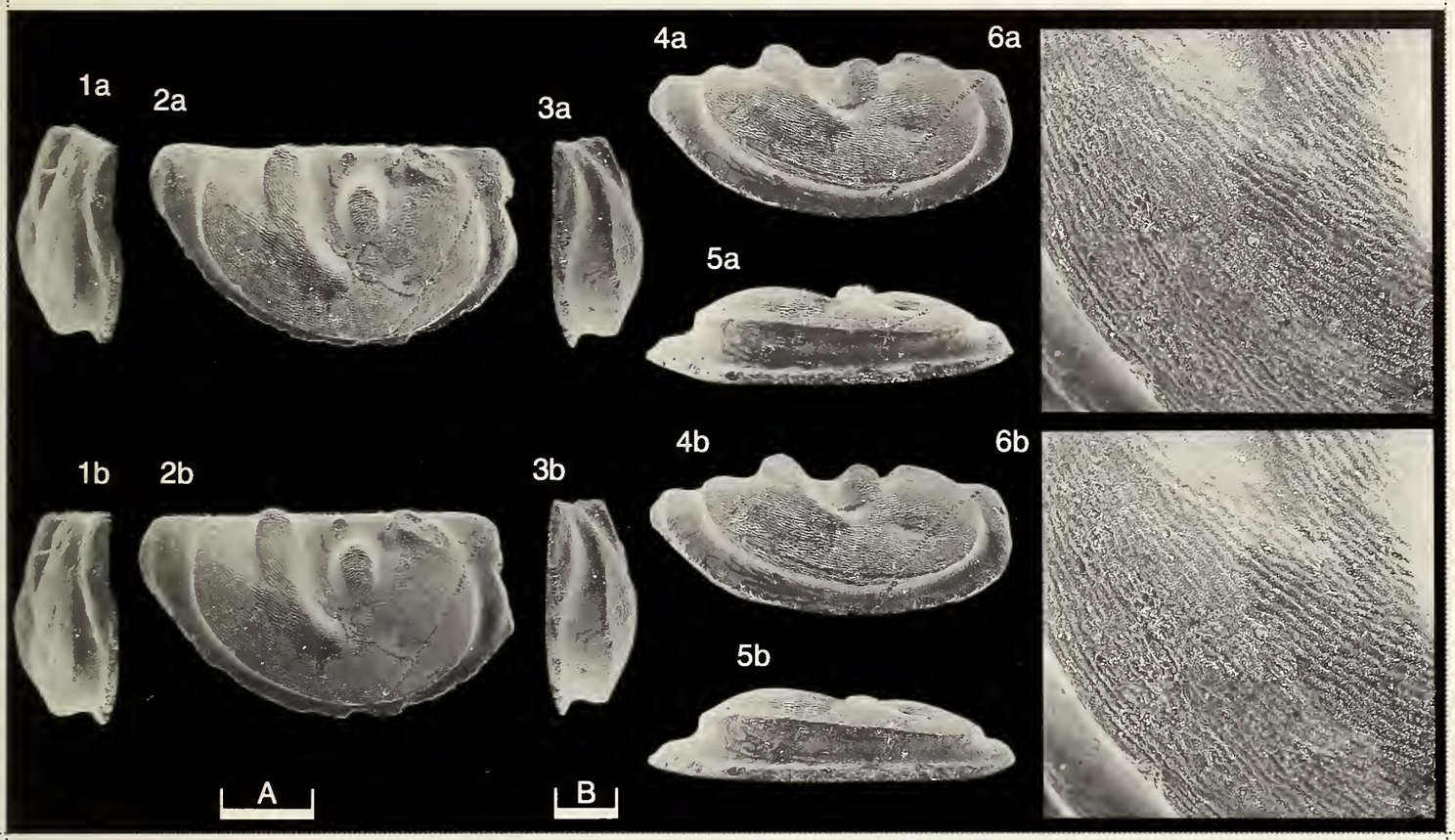
Distribution: Known only from the type locality, Uzbekistan, central Asia.

Acknowledgement: The Royal Society and NATO are thanked for their support.

Explanation of Plate 20, 70

Figs. 1–3, 5, ♀ RV (**52/268**; estimated 1100 μm long); fig. 1, ant.; fig. 2, ext. lat.; fig. 3, vent.; fig. 5, ornament on crumina. Figs. 4, 6, ♀ RV (**51/268**; 1375 μm long): fig. 4, ext. lat.; fig. 6, post. Fig. 7, tecnomorphic LV, ext. lat. (**54/268**; 810 μm long). Fig. 8, ♀ cara., ext. vent. of crumina (**53/268**).

Scale A (250 μm; ×45), figs. 1–3, 7, 8; scale B (50 μm; ×200), fig. 5; scale C (250 μm; ×36), figs. 4, 6.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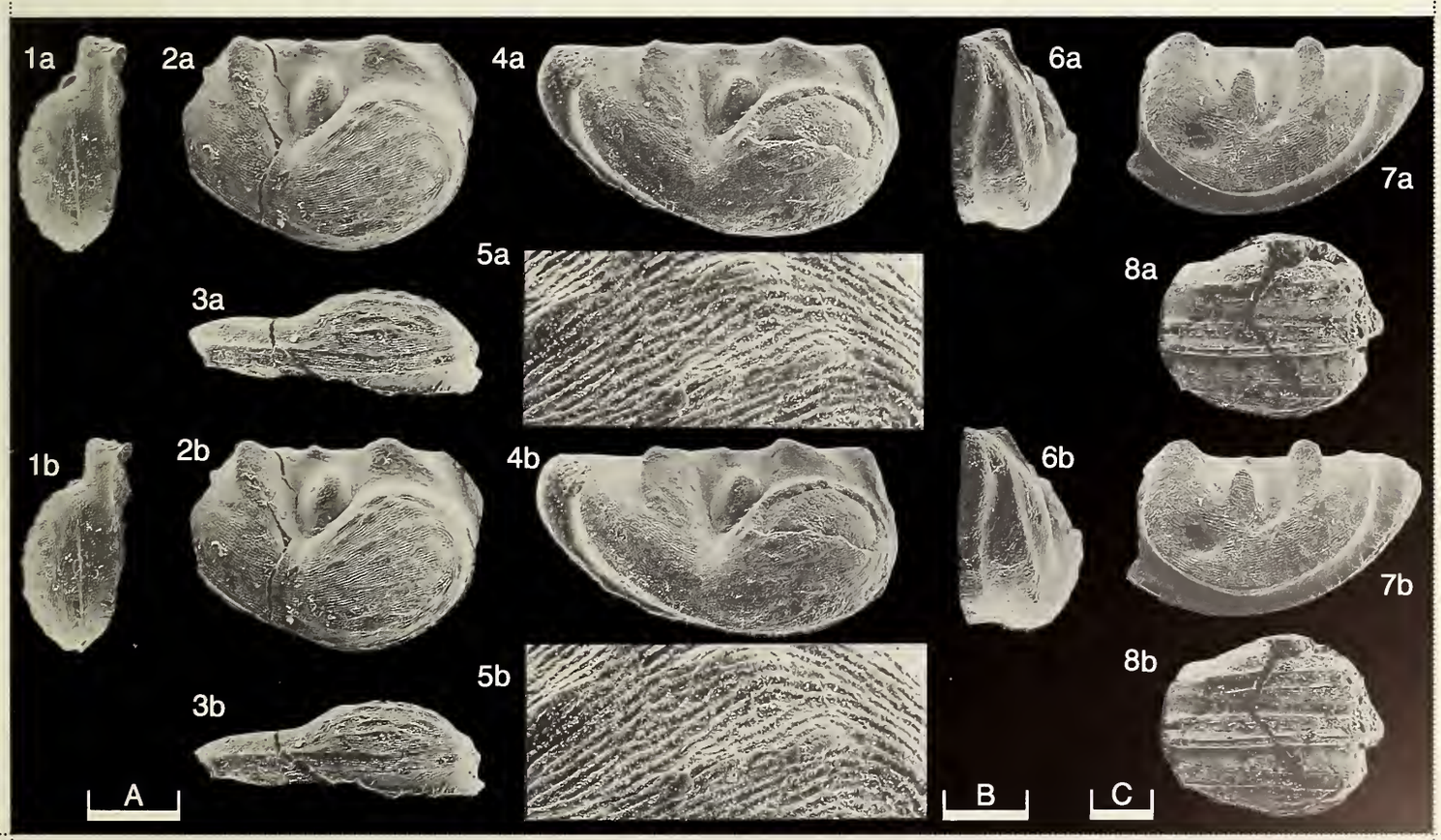
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595.330 (113.23) (420 : 162.001.52 + 485 : 161.013.58 + 57 : 161.106.72): 551.351 + 552.54

ON *ANABAROCHILINA PRIMORDIALIS* (LINNARSSON)

by David J. Siveter, Mark Williams, Anna F. Abushik, Vivianne Berg-Madsen & Ludmila Melnikova
(University of Leicester, England; All-Russian Geological Research Institute, St. Petersburg; University of Uppsala, Sweden; Palaeontological Institute, Moscow)

Genus *ANABAROCHILINA* Abushik, 1960

Type-species: *Leperditia primordialis* Linnarsson, 1869 (senior subjective synonym of *Anabarochilina ventriangulosa* Abushik, 1960 and type-species of *Svealuta* Öpik, 1961)

1960 *Anabarochilina* gen. nov., A.F. Abushik, *Vest. Leningr. gos. Univ.*, (Geol.), **1960**, (6), 96.
1961 *Svealuta* gen. nov., A.A. Öpik, *Bull. Bur. Miner. Resour. Geol. Geophys. Aust.* **53**, 174.

Diagnosis: Large, subamplete bradoriids (?); lateral valve surface characteristically smooth and convex. Marginal rim continuous ventrally, posteriorly and dorsally; demarcated from lateral surface by furrow. Up to three nodes, situated in mid-anterior to anterodorsal region.

Remarks: Jones & McKenzie (1980, 207) thought that *Anabarochilina* differs from *Svealuta* in having its anterodorsal-most node (N1) continuous with the rim of the dorsal margin. Based on comparison of their respective type-species we consider that these genera are synonymous.

Jones & McKenzie (1980) referred *Anabarochilina* to the Bradoriina Raymond, 1935, a taxon which they held to be a heterogeneous group of ancestral ostracods and other bivalved crustaceans. In size and overall morphology we consider that *Anabarochilina* is at least superficially similar to many leperditicopiids (e.g. see Berdan, J. M., *Prof. Pap. U.S. geol. Surv.*, **1066-j**, 1984). Exfoliated specimens of *A. primordialis* reveal a network of fine anastomosing lines diverging from the posterior side of N3 (Pl. **20**, 72, fig. 1; Pl. **20**, 74, fig. 1); lines of similar appearance occur in many

Explanation of Plate 20, 72

Figs. 1–3, RV (**8663**, 11.90 mm long); fig. 1, ext. lat.; fig. 2, vent.; fig. 3, dors. Fig. 4, RV ext. lat. (**BDA 2313**, 8.30 mm long). Scale A (2000 μm; $\times$5), figs. 1–3; scale B (1500 μm; $\times$7), fig. 4.

leperditicopiids (Berdan 1984, 12, pl. 6, fig. 13, pl. 8, figs. 3, 5), where they originate from the adductor muscle scar region and have been interpreted as possible impressions of a muscular structure.

The hinge structures of *Anabarochilina* are unknown. The suggestion that its valves were possibly joined at the dorsum without a hinge line (Jones & McKenzie 1980) is not supported by the fact that disarticulated valves of *A. primordialis* from Scandinavia show well defined straight dorsal margins (hinge line ?).

Distribution: Late middle Cambrian of southern Britain, Scandinavia and Australia and early upper Cambrian of Russia.

Anabarochilina primordialis (Linnarsson, 1869)

1868 *Leperditia* sp.; J.G.O. Linnarsson, *Öfvers. K. VetenskAkad. Förh. Stockh.*, **1868** (1), 54.
1869 *Leperditia primordialis*, n. sp., J.G.O. Linnarsson, *K. svenska. VetensAkad. Handl.*, **8** (2), 84, pl. 2, figs. 65, 66.
1869 *Leperditia (Isochilina) primordialis* n. sp., J.G.O. Linnarsson, *Öfvers. K. VentenskAkad. Förh. Stockh.*, **1869** (2), 196.
1875 *Leperditia primordialis* Linrs.; J.G.O. Linnarsson, *Öfvers. K. VetensksAkad. Förh. Stockh.*, **1875** (5), 45.
1895 *"Leperditia" primordialis* Linrs.; I.D. Wallerius, *Undersökningar öfver zonen med* Agnostus laevigatus *i Vestergötland*, 62, Lund.
1902 *"Leperditia" primordialis* Linnarsson; K.A. Grönwall, *Danm. geol. Unders.*, (ser. 2), **13**, 162.
1910 *L. primordialis*; A.H. Westergård, *Acta. Univ. lund.*, (N.F.2), **6**, 5.
1924 *Aristozoë primordialis* Linnss.; E. Kummerow, *Jb Preuss. geol. Landesanst.*, **44**, 445.
1928 *Aristozoë* (?) *primordialis* (Linrs.); A.H. Westergård, *Geol. För. Stockh. Förh.*, **50**, 198.
1929 *Leperditia primordialis* Lin.; G. Gürich, *Mitt. miner.-geol. StInst. Hamb.*, **11**, 43.
1930 *Aristozoë* (?) *primordialis* (Linrs.); I.D. Wallerius, *Geol. Für. Stockh. Förh.*, **50**, 57.
1931 *Aluta primordialis* (Linnarsson); E.O. Ulrich & R.S. Bassler, *Proc. U.S. nat. Mus.*, **78** (4), 59, pl. 8, figs. 11, 12.
1931 *Aristozoe ("Leperditia") primordialis* Linn.; E. Kummerow, *Zentbl. Miner. Geol. Paläont.*, (Abt. B), **1931**, 253, fig. 15.
1940 *Aluta primordialis* (Linrs.); A.H. Westergård, *Sveriges. geol. Unders.*, **C 437**, 12, 14, 26, 48, 49, 66.
1944 *Aluta primordialis*; A.H. Westergård, *Sveriges geol. Unders.*, **C 459**, 33.
1960 *Anabarochilina ventriangulosa* sp. nov., A.F. Abushik, *Vest. Leningr. gos. Univ.* (Geol.), **1960**, no. 6, 97, figs. 2–4.
1960 *Anabarochilina ventriarcuata* sp. nov., A.F. Abushik, *Vest. Leningr. gos. Univ.*, (Geol.), **1960**, no. 6, 98, figs. 5, 6.
1961 *Svealuta primordialis* (Linnarsson); A.A. Öpik, *Bull. Bur. Miner. Resour. Geol. Geophys. Aust.*, **53**, 174, fig. 58.

Explanation of Plate 20, 74

Fig. 1, RV ext. lat. (**8662**, 8.89 mm long). Fig. 2, LV ext. lat. (holotype of *Leperditia primordialis*, **5322**, 9.25 mm long). Fig. 3, LV ext. lat. (holotype of *Anabarochilina ventriangulosa*, **N 4342/60**, 10.00 mm long). Fig. 4, RV ext. lat. (holotype of *Anabarochilina ventriarcuata*, damaged anteriorly, **N4342/62**, 11.10 mm long).
Scale A (1500 μm; $\times$7), figs. 1, 2; scale B (1500 μm; $\times$6) fig. 3; scale C (2000 μm; $\times$5), fig. 4.


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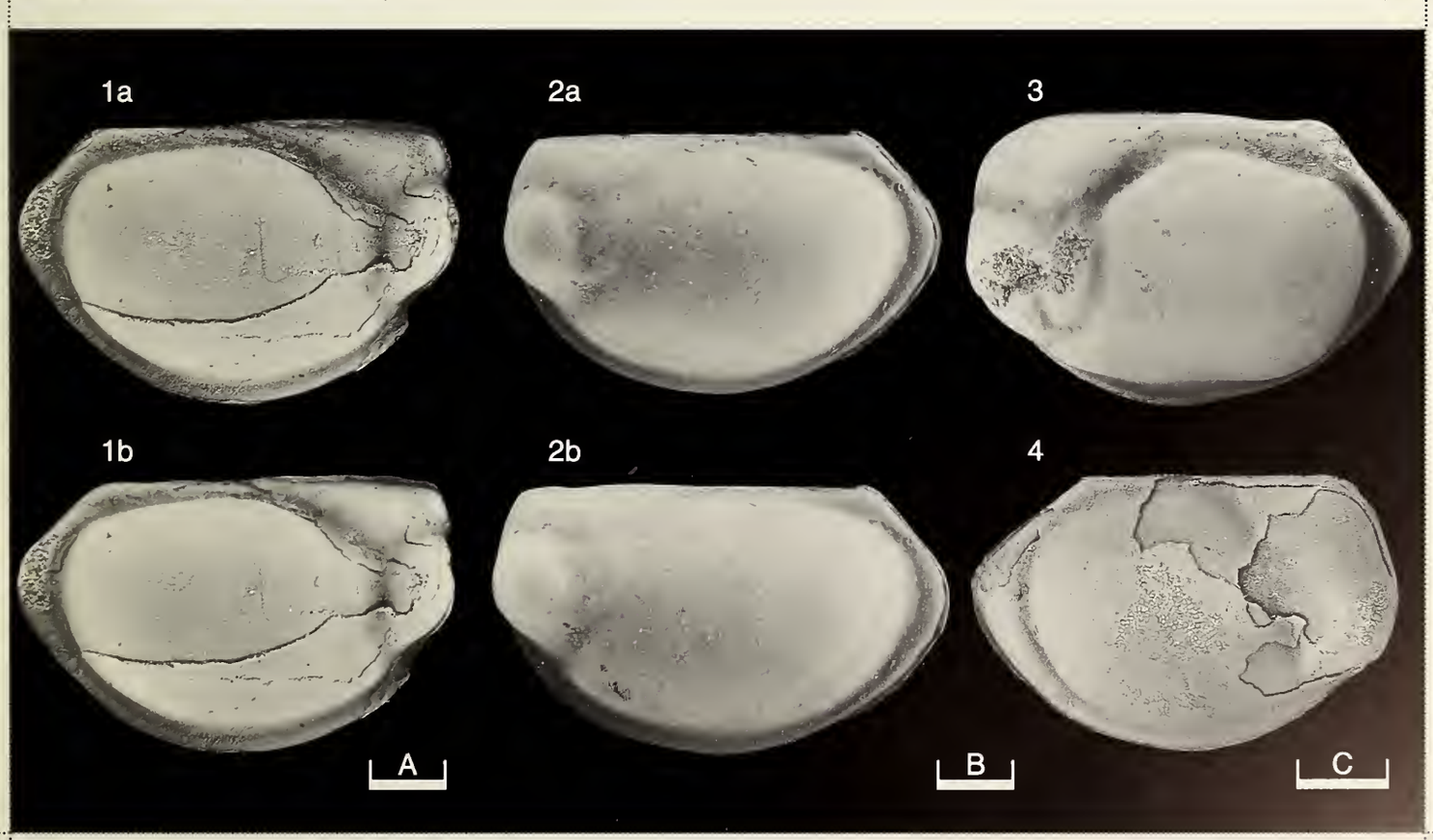
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?1961 *Anabarochilina* sp. M. aff. *A. primordialis* (Linnarsson); A.A. Öpik, *Bull. Bur. Miner. Resour. Geol. Geophys. Aust.*, **53**, 174, pl. 24, figs. 1a–e.
1964 *Aluta primordialis* (Linnarsson); K.J. Müller, *N. Jb. Geol. Paläont. Abh.*, **121** (1), 4.
1978 *Svealuta primordialis* (Linnarsson); A.W.A. Rushton, *Palaeontology*, **21**, 278, pl. 26, fig. 8.
1980 *Leperditia primordialis* Linnarsson; P.J. Jones & K.G. McKenzie, *Alcheringa*, **4**, 207.
?1985a *Svealuta primordialis*; V. Berg-Madsen, *Acta Univ. Upsaliensis*, (Abstr. Uppsala Dissertations, Faculty Science), **781**, 30, fig. 5H.
1985b *Svealuta primordialis*; V. Berg-Madsen, *Bull. geol. Soc. Denmark*, **34**, 171.

Holotype: Sveriges Geologiska Undersökning, Uppsala, Sweden, no. **5322**; left valve.

Type locality: Late middle Cambrian *Lejopyge laevigata* Zone, Blinningsberg, near Falköping, Västergötland, Sweden; lat. 58°10′N, long. 13°33′E.

Figured specimens: Sveriges Geologiska Undersökning, Uppsala, nos. **8663** (RV: Pl. **20**, 72, figs. 1–3), **8662** (RV: Pl. **20**, 74, fig. 1), and **5322** (holotype of *Leperditia primordialis* LV: Pl. **20**, 74, fig. 2). British Geological Survey, Keyworth, England, no. **BDA 2313** (RV: Pl. **20**, 72, fig. 4). Palaeontological Institute, Academy of Sciences, Moscow, nos. **N 4342/60** (holotype of *Anabarochilina ventriangulosa*, LV: Pl. **20**, 74, fig. 4).

Specimen no. **5322** is from the type horizon and locality; **8662** and **8663** are from the middle Cambrian *L. laevigata* Zone, Djopadalen (between Torbjörntorp and Gudhem), Västergötland, Sweden. **BDA 2313** is from the *L. laevigata* Zone, Mancetter Grits and Shales Formation, Merevale borehole no. 3, at depth 198.82 m, Nuneaton area, England (see Taylor, K. & Rushton, A.W.A., *Bull. geol. Surv. Gt Br.*, **35**, 1971). **N 4342/60** and **N 4342/62** are from the Aijusakan stage, early upper Cambrian, vicinity of the River Kotui, E. Siberia.

Diagnosis: Species of *Anabarochilina* with three mid-anterior to anterodorsally situated nodes separated by furrows. N1 low relief, subtriangular in dorsal profile, continuous with dorsal part of marginal rim. N2 subrounded and markedly convex, in lateral view projects over anterior part of marginal rim. N3 low relief, situated immediately behind N2. Marginal rim wider and pointed mid-posteriorly.

Remarks: Part 3 of Angelin's *Palaeontologica Scandinavica* was never published but several of the plates were printed and privately distributed in 1854 and 1860 (see Spjeldnaes, N., *Geol. För. Stockh. Förh.*, **88**, 407, 1966). These include Plate A, which has the earliest known illustrations (figs. 9a–c; left and right valves) of *A. primordialis*.

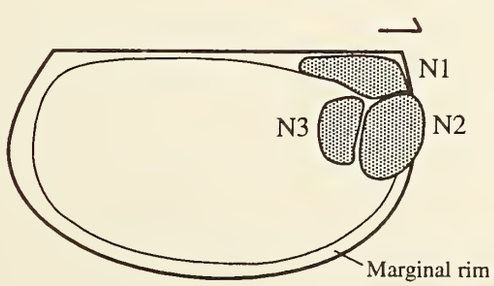
We consider that *Leperditia primordialis* Linnarsson, 1869, *Anabarochilina ventriarcuata* Abushik, 1960 and *Anabarochilina ventriangulosa* Abushik, 1960 are all synonymous; holotypes of all three taxa are illustrated herein. We think that *Anabarochilina* sp. M. aff. *A. primordialis* of Öpik (1961), which was based on a single anteriorly incomplete right valve from the late middle Cambrian of Australia, might also be conspecific with *A. primordialis*. Öpik misinterpreted (1961, fig. 58) the morphology of *A. primordialis* in not recording the presence of N3 or the continuous nature of N1 with the dorsal part of the marginal rim. Öpik (1961) also stated that *A. primordialis* was abundant in the middle Cambrian *Solenopleura brachymetopa* Zone in Sweden, but we know

of no firm supporting evidence for that supposed occurrence. Moreover, he made no reference to its confirmed occurrence in the overlying *L. laevigata* Zone in Scandinavia. Berg-Madsen's (1985a, fig. 5H) *A. primordialis* from the Upper Alum Shale (*Lejopyge laevigata* Zone) of Bomholm, Denmark is herein referred to that species with doubt as it is incomplete and differs in the absence of anterior nodes and in the form of the marginal rim.

Distribution: Widely documented from the late middle Cambrian *L. laevigata* Zone in Denmark (Berg-Madsen 1985b), Sweden (Westergård 1928, Wallerius 1930) and southern Britain (Nuneaton area; see Rushton 1978) and from the Aijusakan stage, early upper Cambrian of E. Siberia, Russia (Abushik 1960). Its supposed presence in the underlying *S. brachymetopa* Zone in Scandinavia (see above) has not been corroborated.

Acknowledgements: DIS and MW thank the Natural Environment Research Council (Grant GR8655) for supporting this research.

Text-fig. 1. Terminology for the nodes in *A. primordialis* (right valve).



595.336 (113.312) (766 : 162.097.34): 551.351 + 552.52

ON *CRYPTOPHYLLUS NUCULOPSIS* HARRIS

by Mark Williams
(University of Leicester, England)

Cryptophyllus nuculopsis Harris, 1957

1957 *Cryptophyllus nuculopsis* n. sp., R.W. Harris, *Bull. Okla geol. Surv.*, **55**, 182, pl. 5, figs. 11a, b.
1962 *Cryptophyllus nuculopsis*; P.J. Jones, *Bull. Bur. Miner. Resour. Geol. Geophys. Aust.*, **62–3**, 5.
1968 *Cryptophyllus nuculopsis* Harris; P.J. Jones, *Bull. Bur. Miner. Resour. Geol. Geophys. Aust.* **99**, 65.

Holotype: Museum of Comparative Zoology, Harvard University, U.S.A., no. **MCZ 4568**; a carapace.

Type locality: From C.E. Decker's Zone 31 (see Harris 1957), Mountain Lake Member, Bromide Formation, Simpson Group, middle Ordovician; U.S. Highway 77 section (sec. 25, T2S, R1E), Arbuckle Mountains, Oklahoma, U.S.A.; approximately lat. 34°25′N, long. 97°08′W.

Figured specimens: Museum of Comparative Zoology, Harvard University, U.S.A., no. **MCZ 4568** (Holotype car.: Pl. **20**, 78, figs. 1, 3; Pl. **20**, 80, fig. 3). The Natural History Museum, London, [BMNH] no. **OS 14581** (car.: Pl. **20**, 78, fig. 2; Pl. **20**, 80, figs. 1, 2). Holotype from the type horizon and locality. **OS 14581** from the Mountain Lake Member, Bromide Formation, Highway 99 section (see Harris 1957), approximately 39 metres below the top of the Formation.

Diagnosis: Posteriorly elongated *Cryptophyllus*, lateral outline like that of the bivalve genus *Mytilus*. Up to eight retained lamellae.

Remarks: *C. nuculopsis* differs from the type species of *Cryptophyllus* Levinson, 1951, *C. oboloides* (Ulrich & Bassler, 1923), by its posteriorly elongate outline and consistently greater number of retained lamellae.

The carapace of *C. nuculopsis* appears to be equivalved with no evidence of overlap.

Explanation of Plate 20, 78

Figs. 1–3, car. (holotype, **MCZ 4568**, 0.72 mm long): fig. 1, LV ext. lat.; fig. 3, dors. obl. Fig. 2, car. ant. (**OS 14581**, 0.70 mm long). Scale A (100 μm; ×103), figs. 1, 2; scale B (100 μm; ×96), fig. 3.

The lamellae of *C. nuculopsis* are typical for the genus *Cryptophyllus*, contrasting with the morphology of lamellae in the related genus *Eridoconcha* Ulrich & Bassler, 1923 (e.g. see Williams & Jones 1990, *Stereo-Atlas Ostracod Shells*, **17**, 13–18) by lacking adventral ridges. Transverse thin sections show successive lamellae underlapping previous lamellae, the contact between the lamellae viewed in transverse profile being "v"-shaped (Text-fig. 1).

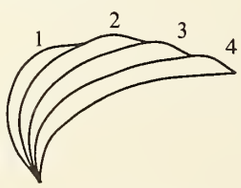
In Simpson Group species of *Cryptophyllus* the morphology of the exposed portion of the lamellae in transverse profile can be gently concave as in *C. nuculopsis*, planar to weakly convex as in *C. magnus* (Harris, 1931), or convex as in *C. gibbosus* Harris, 1957.

C. nuculopsis occurs in the Bromide Formation together with other eridostracans (*Eridoconcha simpsoni* Harris, 1931 and *C. gibbosus*) where they characterise open marine shelf environments.

Distribution: Tulip Creek Formation and Mountain Lake Member of the Bromide Formation, Simpson Group, middle Ordovician, Oklahoma, U.S.A.

Acknowledgements: N.E.R.C. (Britain), the Humboldt Foundation (Germany) and the Université Claude Bernard, Lyon (France) supported this research. Dr J.M. Berdan is thanked for loan of specimens.

Text-fig. 1. Schematic transverse section through the first four lamellae of a valve of *C. nuculopsis* (based on a thin-sectioned carapace, **MP 435/7**, Leicester University, Geology Department collection).

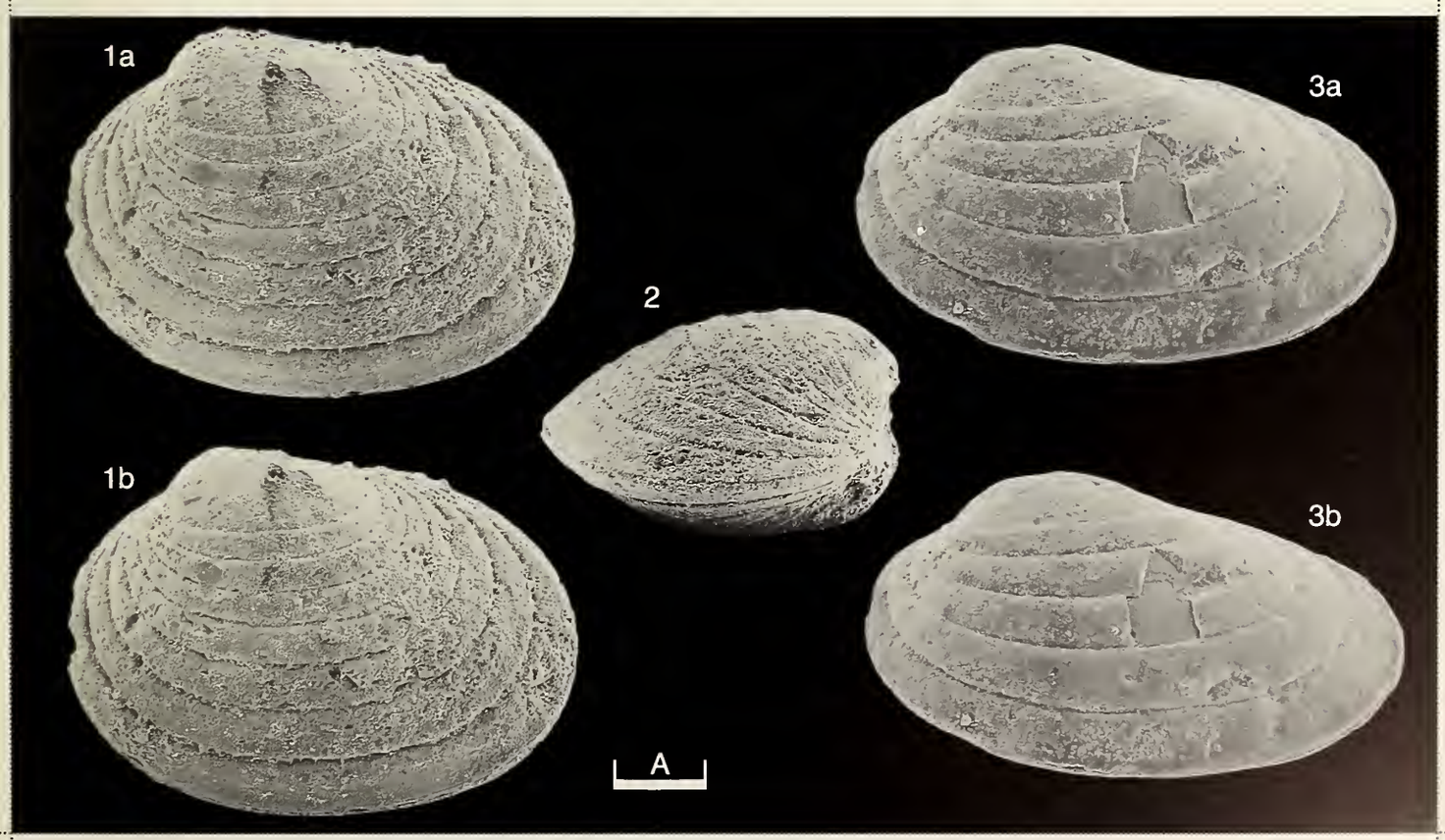


Explanation of Plate 20, 80

Figs. 1, 2, car. (**OS 14581**, 0.70 mm long): fig. 1, LV ext. lat.; fig. 2, post. Fig. 3, car., LV ext. lat. obl. (holotype, **MCZ 4568**, 0.72 mm long).

Scale A (100 μm; ×103), figs. 1–3.


1a
3a
2
1b
3b
A
B


1a
3a
2
1b
3b
A

595.336.14 (113.63) (510 : 161.104.31): 551.351 + 552.54

ON *NEOAMPHISSITES COSTATUS* BECKER & WANG

by Gerhard Becker & Wang Shang-qi
(Senckenberg Museum, Frankfurt am Main, Germany & Institute of Geology and Palaeontology, Nanjing, China)

Genus *Neoamphissites* Becker & Wang, 1992
Type-species (by original designation): *Neoamphissites costatus* Becker & Wang, 1992

Diagnosis: Amphissitid genus with small but distinct subcentral node, rather conspicuous posterior lobe and diffuse anterior lobe restricted to the anteromedian part of the valve. Outer carina flange-like; dorsal ridge and reduced inner carina developed; distinct horizontal ridge, crossing the subventral node; subdued additional ridge(s) possible. Ridges coarse; carapace surface delicately reticulate.

Remarks: *Neoamphissites* belongs to the Family Amphissitidae Knight, 1928 (Superfamily Kirkbyacea Ulrich & Bassler, 1906) because of the presence of a subcentral node. Within the family, it seems closely related to the middle Pennsylvanian (Desmoinesian) *Amphissites (Amphikegelites)* Sohn, 1983 (*Bull. Am. Paleont.*, **84**/316, 12). In *Neoamphissites*, however, the subcentral node is more distinct; moreover, a low anterior lobe, restricted to the anteromedian part of the valve, and horizontal ridge(s) are developed. The latter feature resembles somewhat the Middle Devonian genus *Amphizona* Kesling & Copeland, 1954 (Family Arcyzonidae Kesling, 1961).

The genus is monotypic.

Distribution: Upper Permian of China.

Explanation of Plate 20, 82

Figs. 1, 3, adult RV (holotype, **NIGP 115670**, 1110 μm long): fig. 1, ext. lat.; fig. 3, ext. vent. lat. obl. Fig. 2, juv. RV, vent. (paratype, **NIGP 115672**, 810 μm long).
Scale A (300 μm; ×67), figs. 1, 3; scale B (100 μm; ×95), fig. 2.

Neoamphissites costatus Becker & Wang, 1992

1992 *Neoamphissites costatus* sp. nov. G. Becker & Wang Shang-qi, *Palaeontographica*, **A224**, 15, pl. 2, figs. 1–3.

Holotype: Institute of Geology and Palaeontology (NIGP), Academia Sinica, Nanjing, China, no. **NIGP 115670**; an adult right valve.

Type locality: Beichuan, Sichuan Province, China; lat. 104°19′E, long. 31°56′N. Silicious limestones, Wuchuaping Formation, Wuchuapingian, Upper Permian.

Figured specimens: Institute of Geology and Palaeontology (NIGP), Academia Sinica, Nanjing, China, nos. **NIGP 115670** (holotype, adult RV: Pl. **20**, 82, figs. 1, 3; Pl. **20**, 84, figs. 1, 3), **NIGP 115672** (paratype, juv. RV: Pl. **20**, 82, fig. 2; Pl. **20**, 84, figs. 2, 4).

All of the figured specimens are from the type locality and horizon.

Diagnosis: *Neoamphissites* species with three horizontal ridges (inner carina, horizontal and dorsal ridges); an additional, short ridge may occur anteromedianly (cf. Pl. **20**, 82, fig. 1 and Pl. **20**, 84, fig. 4).

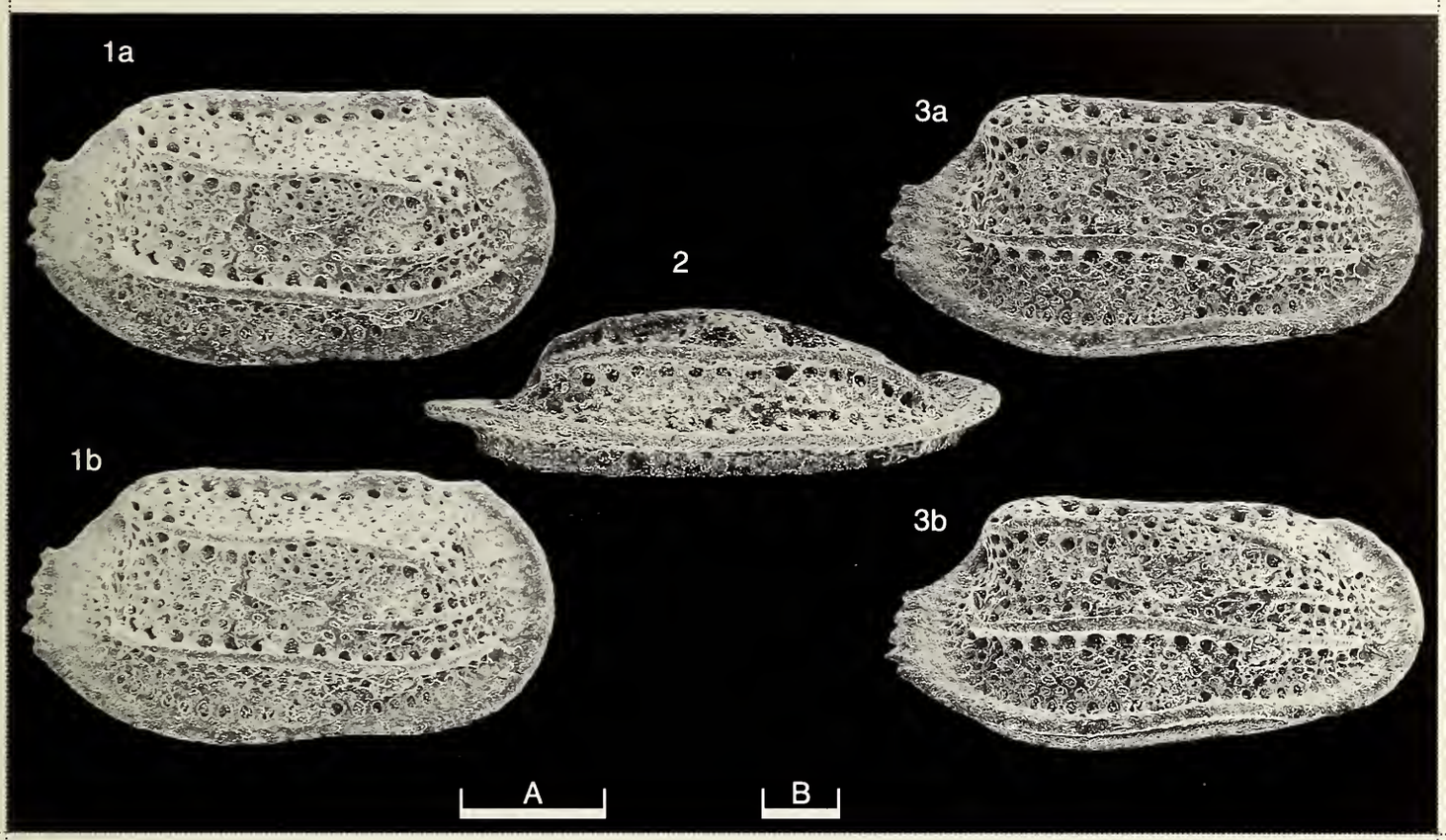
Remarks: *Neoamphissites costatus* is easily recognizable by the three horizontal ridges: reduced inner carina, horizontal and dorsal ridges. An additional short, anteromedian ridge is present in the juvenile specimens available; this may due to ontogenetic or some other form of (non-genetic) variation.

The species is considered to be benthic. The fauna is considered to be from an offshore environment.

Distribution: Only known from the type locality, Permian of China.

Explanation of Plate 20, 84

Figs. 1, 3, adult RV (holotype, **NIGP 115670**, 1110 μm long): fig. 1, ext. dors. lat. obl.; fig. 3, vent. obl. Figs. 2, 4, juv. RV (paratype, **NIGP 115672**, 810 μm long): fig. 2, dors.; fig. 4, ext. dors. lat. obl.
Scale A (300 μm; ×67), figs. 1, 3; scale B (100 μm; ×95), figs. 2, 4.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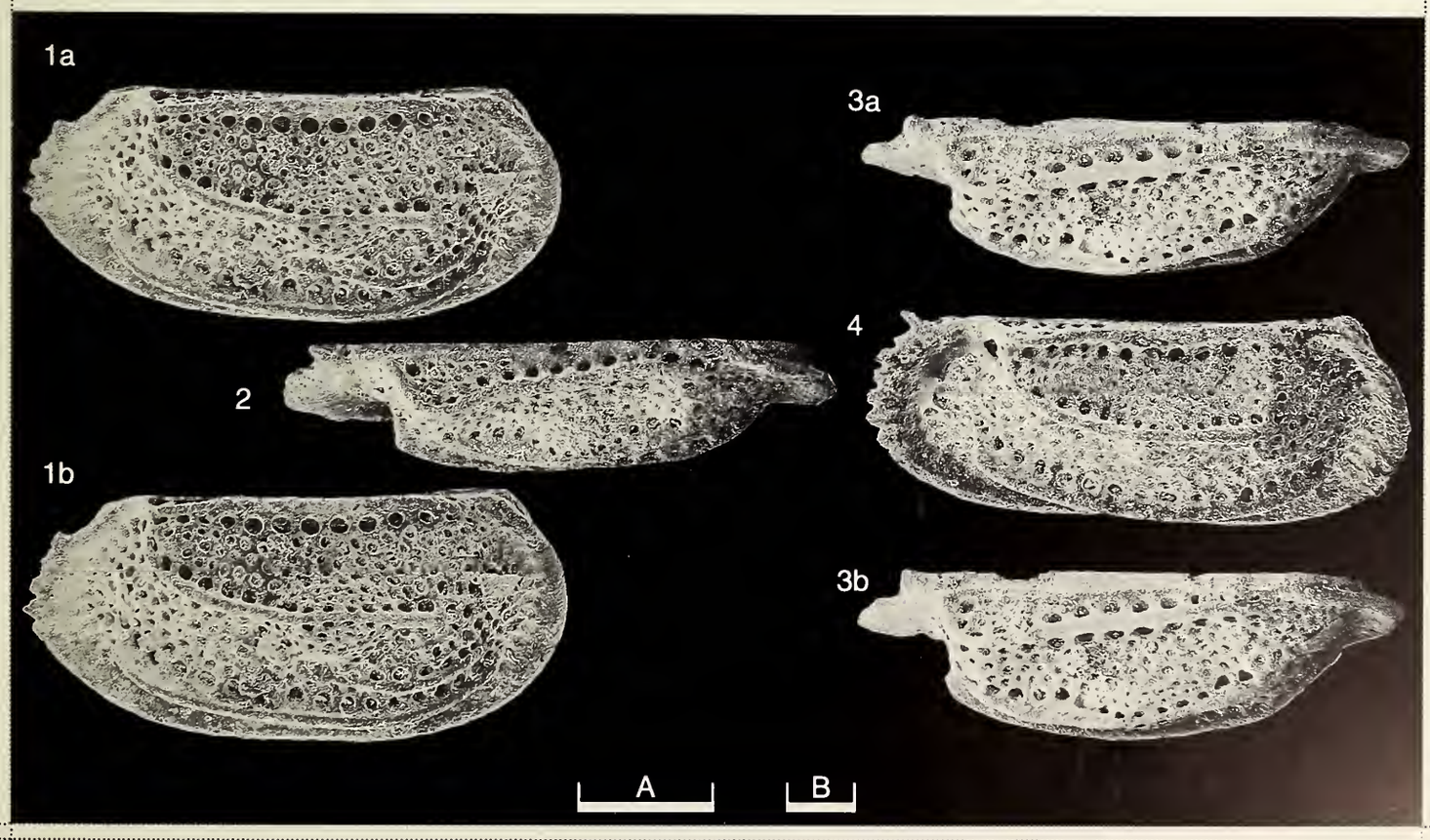
1a
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4
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1b
3b
A
B

595.337.11 (113.63) (510.161.104.31): 551.351 + 552.54

ON *SINABAIRDIA NODOSA* BECKER & WANG

by Gerhard Becker & Wang Shang-qi
(Senckenberg Museum, Frankfurt am Main, Germany & Institute of Geology and Palaeontology, Nanjing, China)

Genus *Sinabairdia* Becker & Wang, 1992

Type-species (by original designation): *Sinabairdia nodosa* Becker & Wang, 1992

Diagnosis: Sculptured bairdiid genus with typical overall bairdiid morphology (outline, contact structures of free margin) and conspicuous, centrally located hump-like inflation with centre above mid-height.

Remarks: *Sinabairdia* belongs to the Family Bairdiidae Sars, 1888 (Superfamily Bairdiacea Sars, 1888). It is characterized by its distinct, subcentrally located carapace protuberance. *Petasobairdia* of Chen 1982 *sensu* Chen 1987 (see Shi Cong-guang & Chen Dequing, *Stratigraphy and Palaeontology of the system boundaries in China, Permian and Triassic boundary*, 46, Nanjing, University Press House, 1987) is considered to be congeneric material (see Becker & Wang, *op. cit.*, 33).

Distribution: Upper Permian of China.

Sinabairdia nodosa Becker & Wang, 1992

1992 *Sinabairdia nodosa* sp. nov. G. Becker & Wang Shang-qi, *Palaeontographica*, **A224**, 33–34, pl. 11, figs. 1–3.

Holotype: Institute of Geology and Palaeontology (NIGP), Academia Sinica, Nanjing, China, no. **NIGP 115743**; an adult carapace.

Explanation of Plate 20, 86

Figs. 1, 3, adult car. (holotype, **NIGP 115743**, 1650 μm long): fig. 1, rt. lat.; fig. 3, dors. Fig. 2, adult LV, vent. (paratype, **NIGP 115745**, 1600 μm long).

Scale A (300 μm; ×45), figs. 1–3.

Type locality: Beichuan, Sichuan Province, China, lat. 104°19′E, long. 31°56′N. Silicious limestones, Wuchuaping Formation, Wuchuapingian, Upper Permian.

Figured specimens: Institute of Geology and Palaeontology (NIGP), Academia Sinica, Nanjing, China, nos. **NIGP 115743** (holotype, adult car.: Pl. **20**, 86, figs. 1, 3; **NIGP 115745** (paratype, adult LV: Pl. **20**, 86, fig. 2; Pl. **20**, 88, fig. 1), **NIGP 115744** (paratype, adult RV: Pl. **20**, 88, figs. 2, 3).

All of the figured specimens are from the type locality and horizon.

Diagnosis: *Sinabairdia* species with posterodorsally located and distinctly tuberculate hump.

Remarks: In general outline *Sinabairdia nodosa* resembles *Petasobairdia* cf. *bicornuta* of Chen, 1982 *sensu* Chen 1987 (*op. cit.*), from the Upper Permian Changsingian of Zhejiang Province, China. *S. nodosa* is distinguished from that taxon by having a dorsal spine on its left valve and a pointed posterior termination to its carapace.

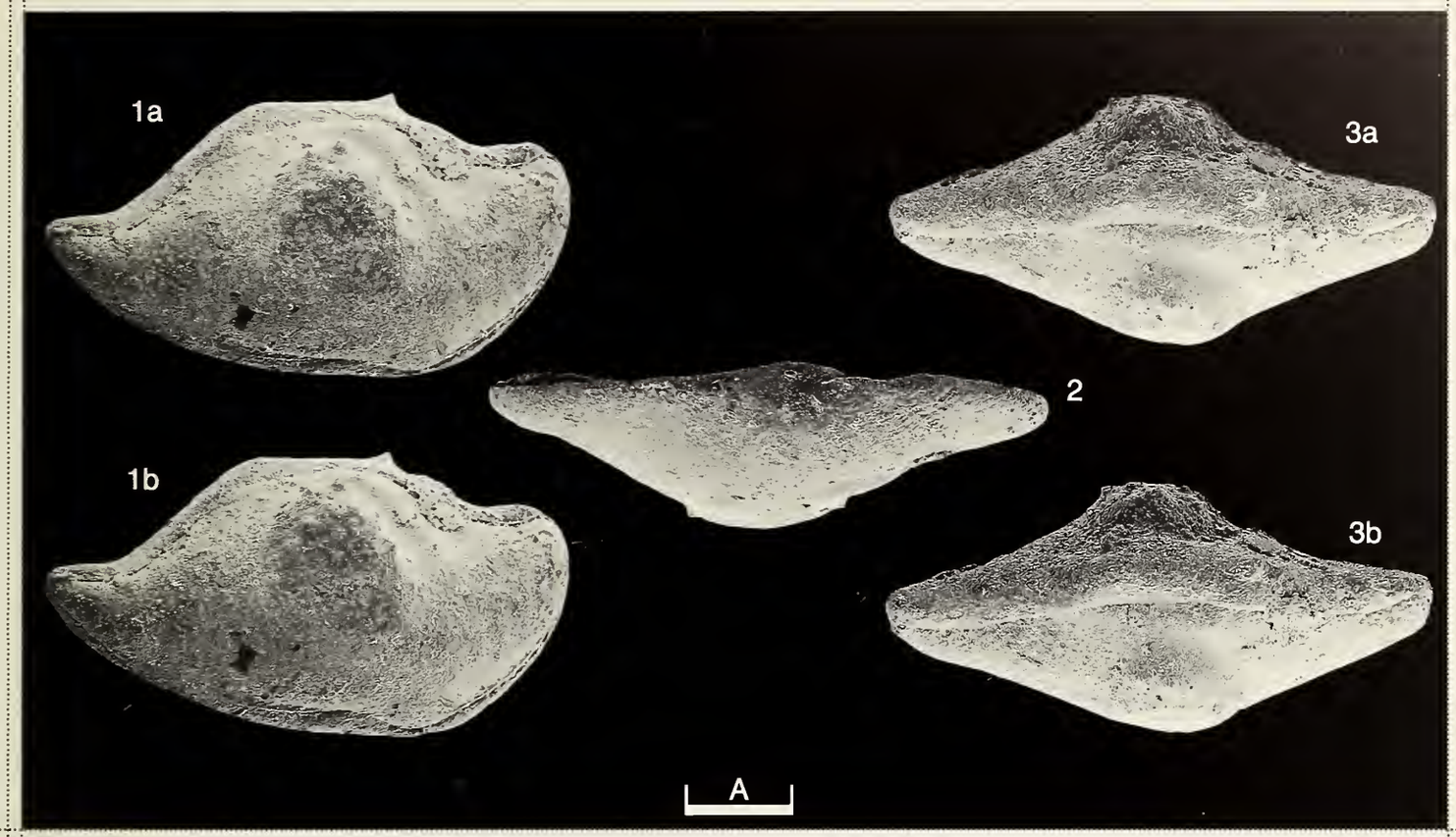
The species is considered to be benthic. The fauna is considered to be from an offshore environment.

Distribution: Only known from the type locality, Permian of China.

Explanation of Plate 20, 88

Fig. 1, adult LV, int. lat. (paratype, **NIGP 115745**, 1600 μm long). Figs. 2, 3, adult RV (paratype, **NIGP 115744**, 1580 μm long): fig. 2, vent.; fig. 3, int. lat.

Scale A (100 μm; ×45), figs. 1–3.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1a
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1b
3b
A

595.337.11 (113.33) (517 : 161.110.41): 551.351 + 552.54

ON *TUBEROSCAPHA OBESA* BECKER & WANG

by Gerhard Becker & Wang Shang-qi
(Senckenberg Museum, Frankfurt am Main, Germany & Institute of Geology and Palaeontology, Nanjing, China)

Genus *Tuberoscapha* Becker & Wang, 1992
Type-species (by original designation): *Tuberoscapha obesa* Becker & Wang, 1992

Diagnosis: Beecherellid genus with lobe-like lateral swellings.

Remarks: Bairdiacea with an elongate, subrectangular to trapeziform outline and compressed or flattened valve margins and undifferentiated hinges are placed in the Family Beecherellidae Ulrich, 1894. The best known genera are *Acanthoscapha* Ulrich & Bassler, 1923 (synonym: *Alanella* Bouček, 1936) and *Beecherella* Ulrich, 1891. *Acanthoscapha* has its greatest length along the dorsal margin and *Beecherella* at the ventral margin.

Taxonomically, the *Acanthoscapha-Beecherella* group has recently been severely "split" by several workers. There are, in fact, intermediate genera (i.e. *Beecheroscapha* Becker, 1992 [*Senckenberg. leth.*, **71**, 401] and *Corniacanthoscapha* Shi & Wang, 1987 [*Late Silurian to Devonian Stratigraphy and Palaeontology between Tewo and Liqu of west Qinling Mts., China*, Nanjing, University Press House, Pt. 2, 323) or genera more-or-less related to *Acanthoscapha* (i.e. *Sohnia* Adamczak, 1976 [*Senckenberg. leth.* **57**, 343], *Rabienoscapha* Becker, 1989 and *Carenthascapha* Becker, 1989 [*Geol. Jb. Hessen*, **117**, 9, 12]). *Tuberoscapha* Becker & Wang, 1992 also belongs to this group. It is distinguished from all *Acanthoscapha* species by the lateral swellings of its valves.

Explanation of Plate 20, 90

Figs. 1, 3, adult RV (paratype, **NIGP 115371**, 950 μm long): fig. 1, ext. lat.; fig. 3, dors. obl. Fig. 2, adult LV, dors. (holotype, **NIGP 115770**, 1250 μm long).
Scale A (200 μm; ×86), fig. 1; scale B (200 μm; ×68), fig. 2; scale C (200 μm; ×100), fig. 3.

The taxonomic splitting is analogous to that affecting other groups (e.g. Amphissitidae, Tricorninidae and sculptured Bairdiidae) and is a result of the increased availability of material in connection with intensified studies on pelagic facies. The latter are the realm of the Thuringian Ecotype, to which the taxa mentioned belong.

Distribution: Middle/Upper Silurian of China.

Tuberoscapha obesa Becker & Wang, 1992

1992 *Tuberoscapha obesa* sp. nov. G. Becker & Wang Shang-qi, *Palaeontographica*, **A224**, 40, 41, pl. 23, figs. 5–8.

Holotype: Institute of Geology and Palaeontology (NIGP), Academia Sinica, Nanjing, China, no. **NIGP 115770**; an adult

Type locality: Damaoqi, Neimongol (Inner Mongolia) Autonomous Region, lat. 110°14′E, long. 41°40′N. Silicious limestones, Bateaobao Formation, Wenlock or Ludlow Series, Middle/Upper Silurian.

Figured specimens: Institute of Geology and Palaeontology (NIGP), Nanjing, China nos. **NIGP 115770** (holotype, adult LV: Pl. **20**, 90, fig. 2; Pl. **20**, 92, figs. 1–3) and **NIGP 115771** (paratype, adult RV: Pl. **20**, 90, figs. 1, 3).

All of the figured specimens are from the type locality and horizon.

Diagnosis: *Tuberoscapha* species with two lateral swellings; posterior swelling more conspicuous. Carapace surface striate.

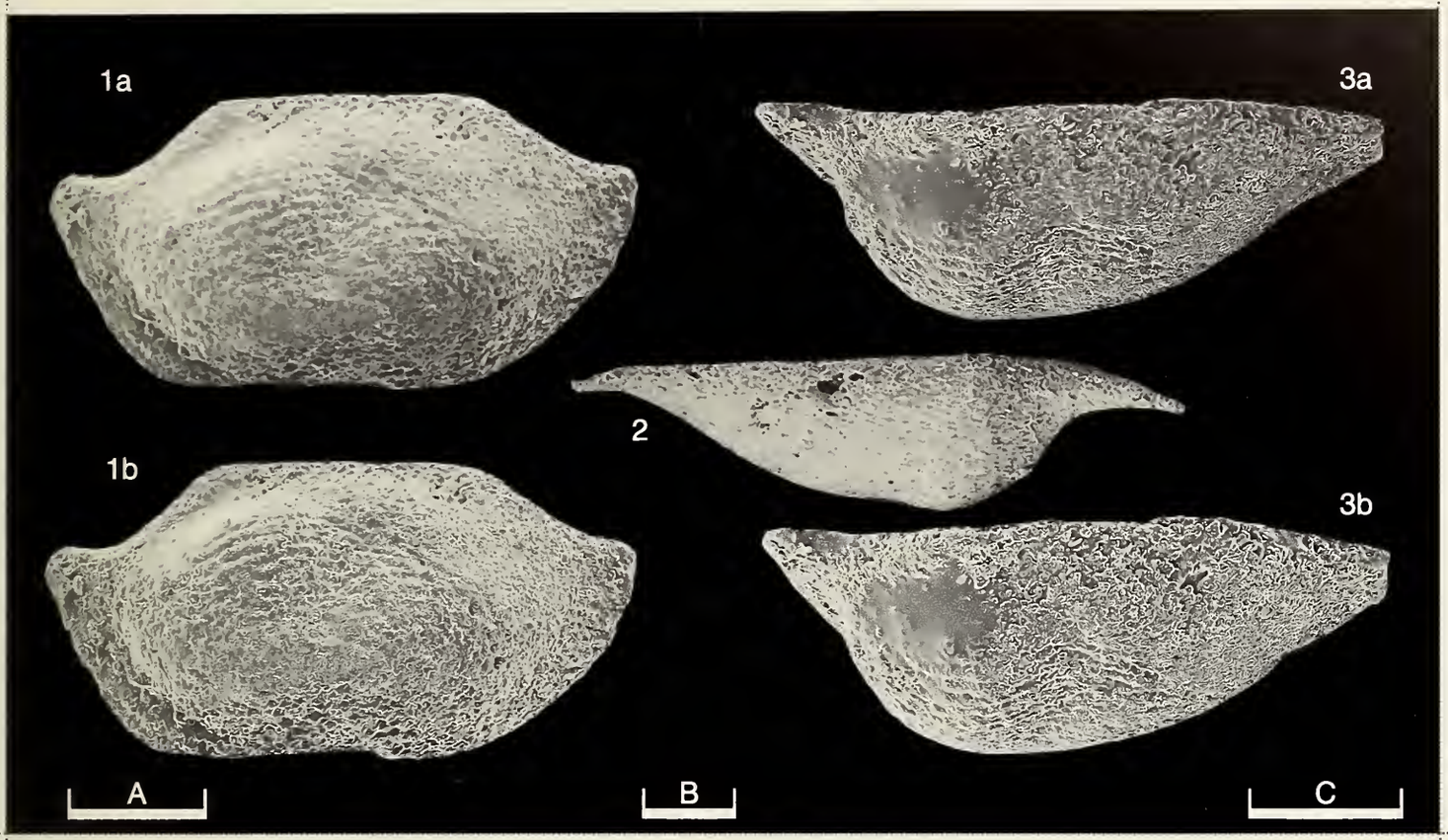
Remarks: *Tuberoscapha obesa* is characterized by having distinct, striate swellings. *Tuberoscapha* sp. A Becker & Wang, 1992 (*op. cit.*, 41) shows narrow, inconspicuous swellings.

The species is considered to be necto-benthic. The fauna is from an open marine to basinal environment.

Distribution: Only known from the type locality, Silurian of China.

Explanation of Plate 20, 92

Figs. 1–3, adult LV (holotype, **NIGP 115611**, 1250 μm long): fig. 1, int. lat.; fig. 2 vent.; fig. 3, ext. lat.
Scale A (300 μm; ×72), fig. 1; scale B (300 μm; ×68), figs. 2, 3.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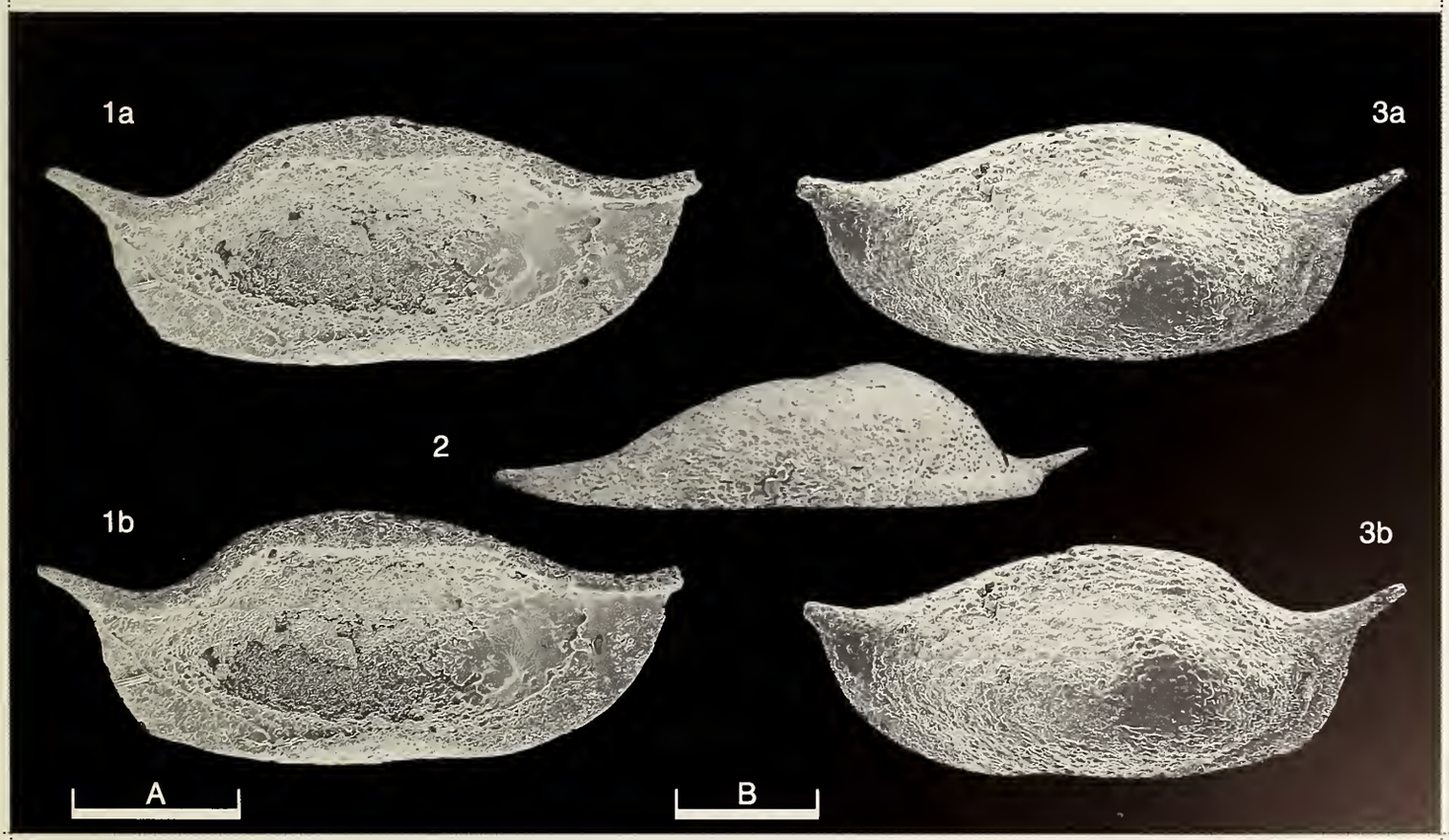
C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3b
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B

595.337.11 (113.33) (517 : 161.110.41): 551.351 + 552.54

ON *BULBOSOHNIA BOLBOFORMIS* BECKER & WANG

by Gerhard Becker & Wang Shang-qi
(Senckenberg Museum, Frankfurt am Main, Germany & Institute of Geology and Palaeontology, Nanjing, China)

Genus *Bulbosohnia* Becker & Wang, 1992
Type-species (by original designation): *Bulbosohnia bolboformis* Becker & Wang, 1992

Diagnosis: Beecherellid genus with mid-dorsal hump.

Remarks: Bairdiacea with an elongate, subrectangular to trapeziform outline and compressed or flattened valve margins and undifferentiated hinges are placed in the Family Beecherellidae Ulrich, 1894. The best known genera are *Acanthoscapha* Ulrich & Bassler, 1923 (synonym: *Alanella* Bouček, 1936) and *Beecherella* Ulrich, 1891. *Acanthoscapha* has its greatest length along the dorsal margin and *Beecherella* at the ventral margin.

Taxonomically, the *Acanthoscapha-Beecherella* group has recently been severely "split" by several workers. There are, in fact, intermediate genera (i.e. *Beecheroscapha* Becker, 1992 [*Senckenberg. leth.*, **71**, 401] and *Corniacanthoscapha* Shi & Wang, 1987 [*Late Silurian to Devonian Stratigraphy and Palaeontology between Tewo and Ligu of west Qinling Mts., China*, Nanjing, University Press House, Pt. 2, 323]) or genera more-or-less related to *Acanthoscapha* (i.e. *Sohnia* Adamczak, 1976 [*Senckenberg. leth.* **57**, 343], *Rabienoscapha* Becker, 1989 and *Carenthascapha* Becker, 1989 [*Geol. Jb. Hessen*, **117**, 9, 12]). *Bulbosohnia* Becker & Wang, 1992 also belongs to this group. It is distinguished from all *Acanthoscapha* species (especially *A. subnavicula* Abushik, 1968) and from the *Sohnia* species by its dorsal hump.

The taxonomic splitting is analogous to that affecting other groups (e.g. Amphissitidae, Tricorninidae

Explanation of Plate 20, 94

Figs. 1–3, adult car. (holotype, **NIGP 115782**, 1380 μm long): fig. 1, rt. lat.; fig. 2, dors. obl.; fig. 3, vent. obl.
Scale A (300 μm; ×60), figs. 1, 3; scale B (300 μm; ×56), fig. 2.

and sculptured Bairdiidae) and is a result of the increased availability of material in connection with intensified studies on pelagic facies. The latter are the realm of the Thuringian Ecotype, to which the taxa mentioned belong.

Distribution: Silurian of China and N. America.

Bulbosohnia bolboformis Becker & Wang, 1992

1992 *Bulbosohnia bolboformis* sp. nov. G. Becker & Wang Shang-qi, *Palaeontographica*, **A224**, 42, 43, pl. 14, figs. 1–4.

Holotype: Institute of Geology and Palaeontology (NIGP), Academia Sinica, Nanjing, China, no. **NIGP 115782**; an adult carapace.

Type locality: Damaoqi, Neimongol (Inner Mongolia) Autonomous Region, lat. 110°14′E, long. 41°40′N. Silicious limestones, Bateaobao Formation, Wenlock or Ludlow Series, Middle/Upper Silurian.

Figured specimens: Institute of Geology and Palaeontology (NIGP), Nanjing, China nos. **NIGP 115782** (holotype, adult car.: Pl. **20**, 94, figs. 1–3), **NIGP 115783** (paratype, adult LV: Pl. **20**, 96, fig. 1), **NIGP 115784** (paratype, adult LV: Pl. **20**, 96, fig. 2), **NIGP 115785** (paratype, adult car.: Pl. **20**, 96, fig. 3).

All of the figured specimens are from the type locality and horizon.

Diagnosis: *Bulbosohnia* species with globular hump; dorsal projections located admarginally.

Remarks: *Bulbosohnia bolboformis* is similar to *Acanthoscapha subnavicula* Abushik, 1968 of Copeland 1977 (*Bull. geol. Surv. Can.*, **275**, 40) from the Silurian of Canada. The latter material is probably conspecific.

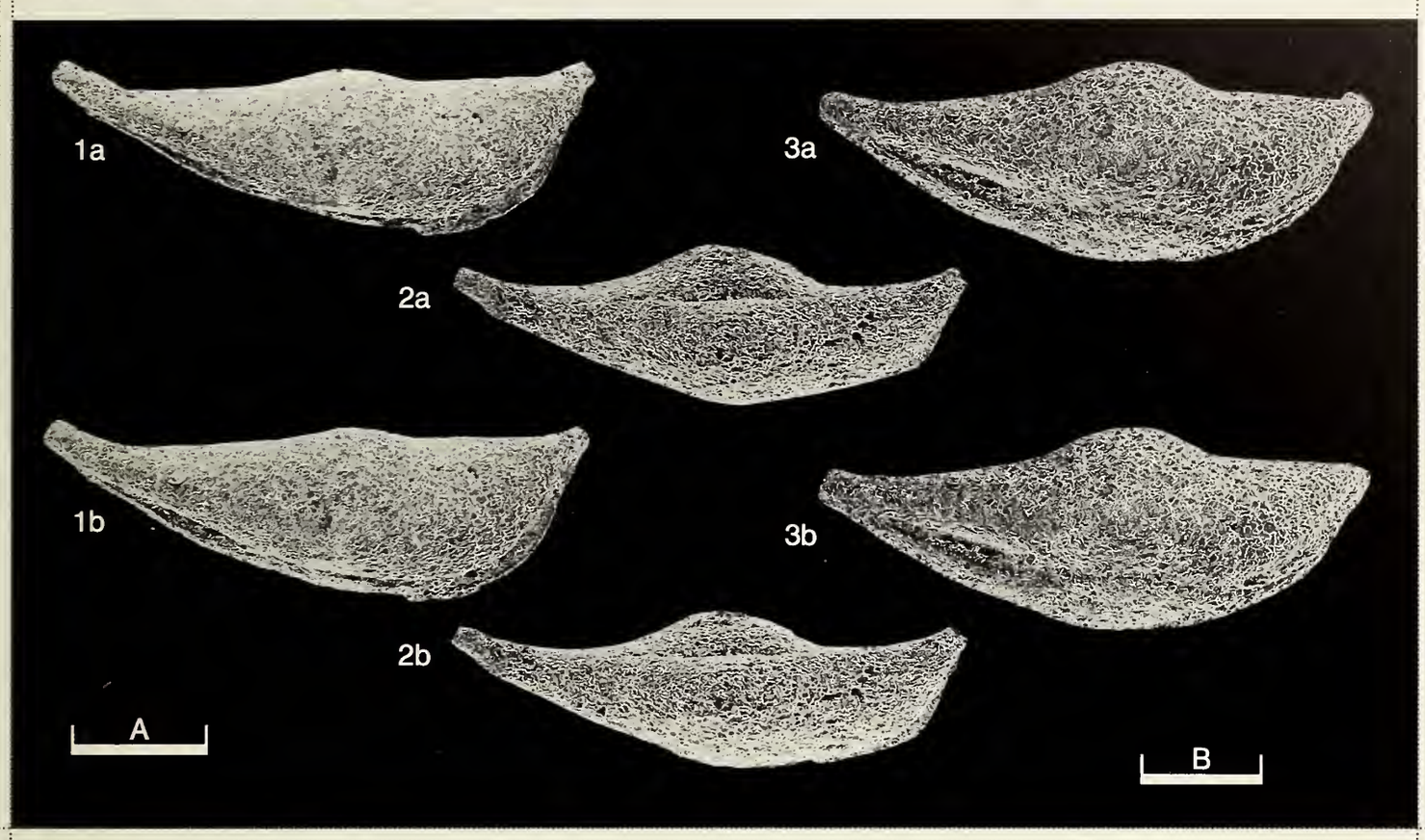
In *Bulbosohnia* sp. A of Becker & Wang, 1992 (*op. cit.*, 43), the hump is inconspicuous and the anterodorsal projection located extramarginally. The Middle Devonian *Sohnia sohni* Adamczak, 1976 (*Senckenbergiana*, **57**, 344) resembles *B. bolboformis* in general carapace morphology; however, it lacks a hump.

B. bolboformis is considered to be nectobenthic. The fauna is from an open marine to basinal environment.

Occurrence: The species is known with certainty only from the type locality. Probably also occurs in the Wenlock-Ludlow series, Silurian, District of Mackenzie, Canada.

Explanation of Plate 20, 96

Fig. 1, adult LV, ext. lat. (paratype, **NIGP 115783**, 1000 μm long). Fig. 2, adult LV, int. lat. (paratype, **NIGP 115784**, 1330 μm long). Fig. 3, adult car., vent. (paratype, **NIGP 115785**, 1460 μm long).
Scale A (100 μm; ×78), fig. 1; scale B (300 μm; ×57), fig. 2; scale C (300 μm; ×53), fig. 3.


1a
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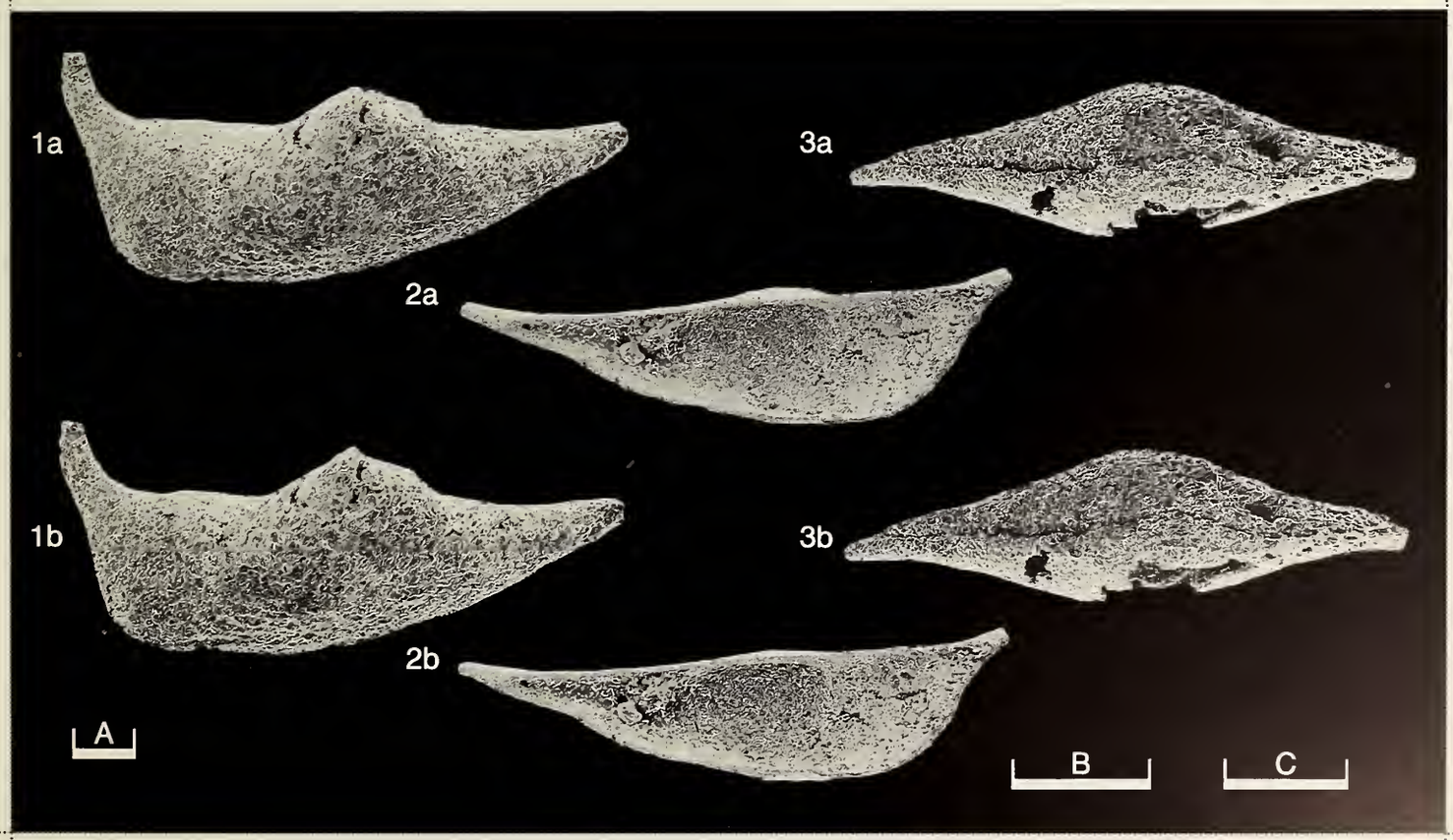
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A
B
C

595.337.14 (118.22) (420 : 162.006.50): 551.351

ON *SEMICYTHERURA CURVICAUDA* MAYBURY sp. nov.

by Caroline A. Maybury
(Institute of Earth Studies, University of Wales, Aberystwyth)

Semicytherura curvicauda sp. nov.

Holotype: The Natural History Museum, London [BMNH] no. **OS 14574**; ♀ RV.
[Paratypes nos. **OS 14572**, **OS 14573**, **OS 14575**, **OS 14576**].

Type locality: Mixed sample, sample no. 1, Vicarage Pit, St. Erth, Cornwall, England (5°26′N, 50°10′N; Nat. Grid Ref. SW 556352): Upper Pliocene.

Derivation of name: Latin, referring to the curved, ornamental murus which commences at the caudal process and is one of the diagnostic characteristics of the new species.

Figured specimens: The Natural History Museum, London [BMNH] nos. **OS 14572** (paratype, ♀ LV: Pl. **20**, 98, fig. 1), **OS 14574** (holotype, ♀ RV: Pl. **20**, 98, fig. 2), **OS 14573** (paratype, ♂ LV: Pl. **20**, 98, fig. 3). **OS 14575** (paratype, ♂ RV: Pl. **20**, 100, fig. 1). **OS 14576** (paratype, ♀ RV: Pl. **20**, 100, figs. 2–4). All paratypes are from the same sample as the holotype. See C.A. Maybury, *Taxonomy, Palaeoecology and Biostratigraphy of Pliocene Benthonic Ostracoda from St. Erth and NW France*, unpub. PhD thesis, Univ. Wales, **1**, 3–6, 1985 for further sample details.

Diagnosis: A subrectangular, very small, reticulate *Semicytherura* with a prominent, curved murus commencing at the dorsal side of the caudal process. The four adductor scars, with the dorsalmost scar set

Explanation of Plate 20, 98

Fig. 1, ♀ LV, ext. lat. (paratype, **OS 14572**, 340 μm long): Fig. 2, ♀ RV, ext. lat. (holotype, **OS 14574**, 340 μm long): Fig. 3, ♂ LV, ext. lat. (paratype, **OS 14573**, 370 μm long).
Scale A (100 μm; ×179), figs. 1–3.

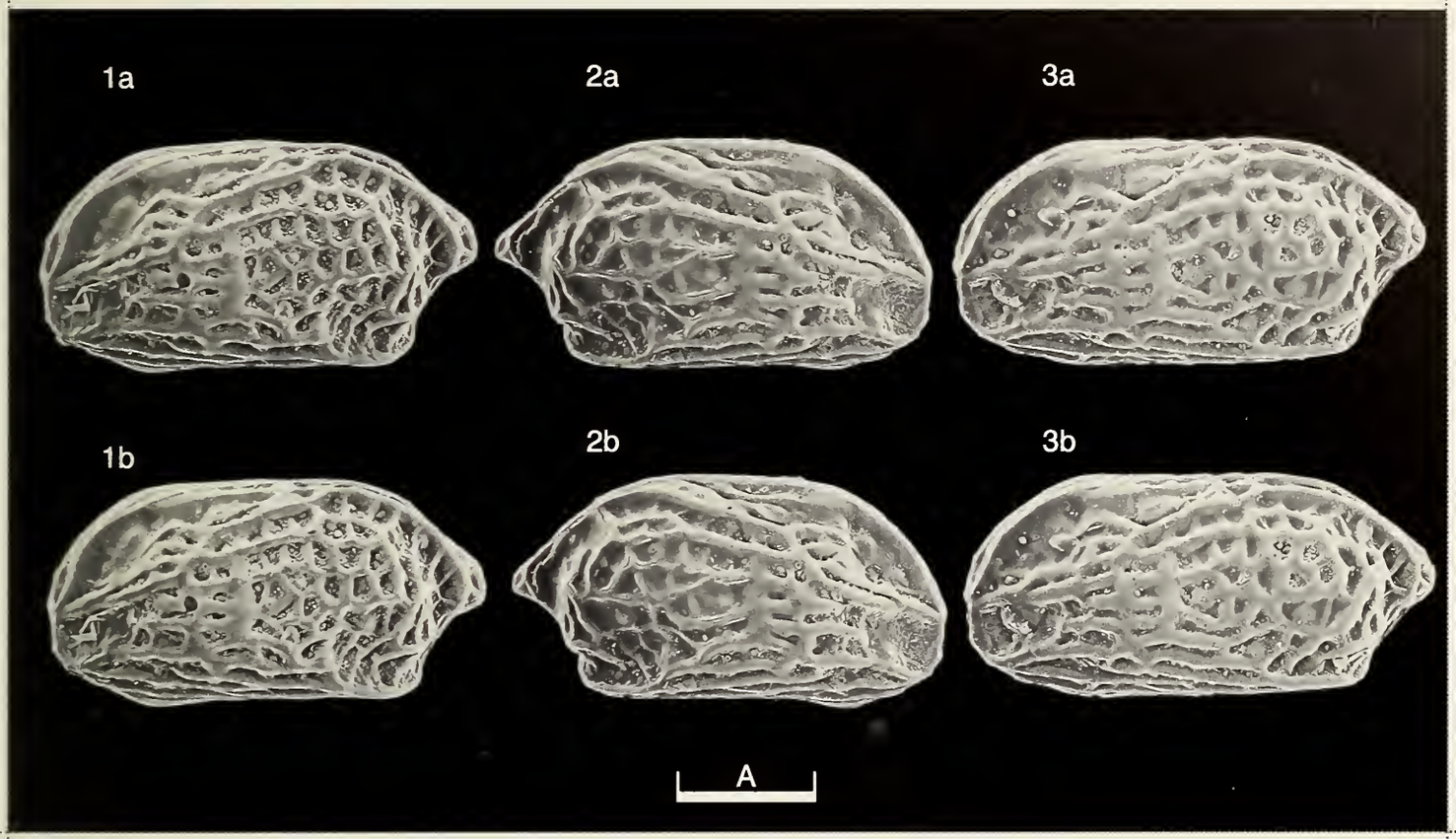
a little apart from the others, are marked externally by fossae in the anteromedian section of the valve.

Remarks: This distinctive species with its robust ornament is one of 28 new species and one new subspecies of *Semicytherura*, which have been recovered from the St. Erth beds.

Distribution: This species has been recovered from the Upper Pliocene deposits of St. Erth, Cornwall, England (sample nos. 1–3, 7, 14–16, 18, 21, 23, 25–28) and the Upper Pliocene (Redonian) deposits of Le Bosq d'Aubigny, NW France. See C. Maybury (*op. cit.*) and J.-P. Margerel, *Les Foraminifères du Redonien. Systématique, Répartition stratigraphique, Paléoécologie*, Nantes, **1**, 8–26. 1968 for details of the British and French samples respectively.

Explanation of Plate 20, 100

Fig. 1, ♂ RV, ext. lat. (paratype, **OS 14575**, 350 μm long): Figs. 2–4 ♀ RV, (paratype, **OS 14576**, 350 μm long): Fig. 2, int. lat.; fig. 3, ant. hinge element; fig. 4, post. hinge element.
Scale A (100 μm: ×179), figs. 1–2; scale B (25 μm; ×403), figs. 3–4.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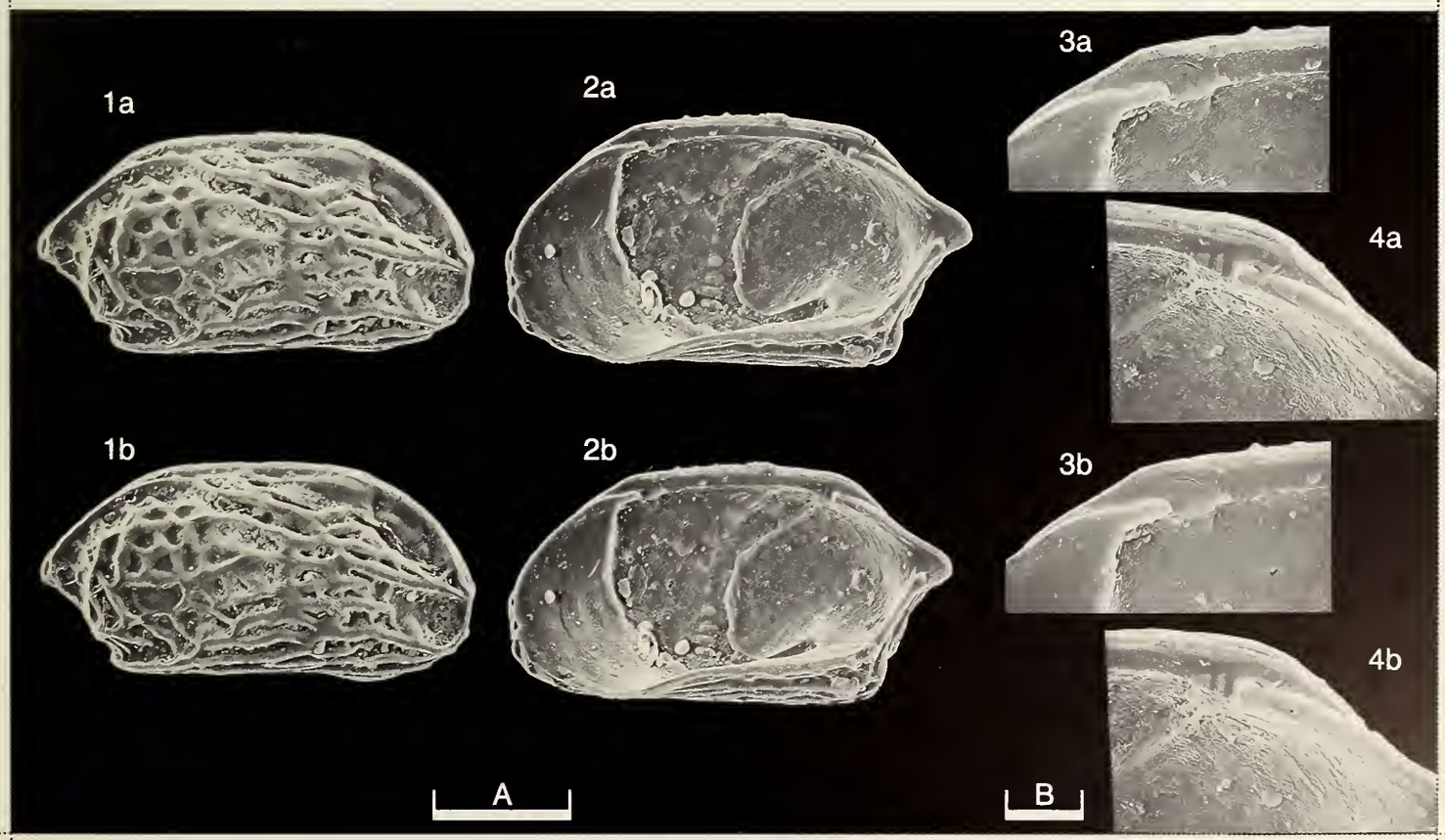

1a
2a
3a
4a
1b
2b
3b
4b
A
B

595.337.14 (118.22) (44 : 162.002.48): 551.351

ON *LOXOCORNICULUM MULTIRETICULATUM* MAYBURY sp. nov.

by Caroline A. Maybury
(Institute of Earth Studies, University of Wales, Aberystwyth)

Loxocorniculum multireticulatum sp. nov.

Holotype: The National History Museum, London [BMNH] no. **OS 14577**; ♀ LV.
[Paratypes nos. **OS 14578–OS 14580**].

Type locality: Shell-rich sand, Le Temple du Cerisier, SW of Rennes (approx. lat. 48°07′N, long. 1°41′W), NW France; Upper Pliocene, Redonian.

Derivation of name: Latin, from its well developed reticulate ornament.

Figured specimens: The Natural History Museum, London [BMNH] nos. **OS 14577** (holotype, ♀ LV: Pl. **20**, 102, fig. 1), **OS 14578** (paratype, ♀ RV: Pl. **20**, 102, fig. 2), **OS 14579** (paratype, ♂ LV: Pl. **20**, 102, fig. 3), **OS 14580** (paratype, ♀ LV: Pl. **20**, 104, figs. 1–4). All paratypes are from the same sample as the holotype. See J.-P. Margerel, *Les Foraminifères du Redonien. Systématique, Répartition stratigraphique, Paléoécologie*, Nantes **1**, 8–26, 1968 for further details of the sample locality.

Diagnosis: A medium sized, subelliptical *Loxocorniculum* with its maximum height at anterior cardinal angle in female and at posterior third in male. Coarsely reticulate with posterodorsal protuberance looping over and obscuring the posterodorsal margin.

Explanation of Plate 20, 102

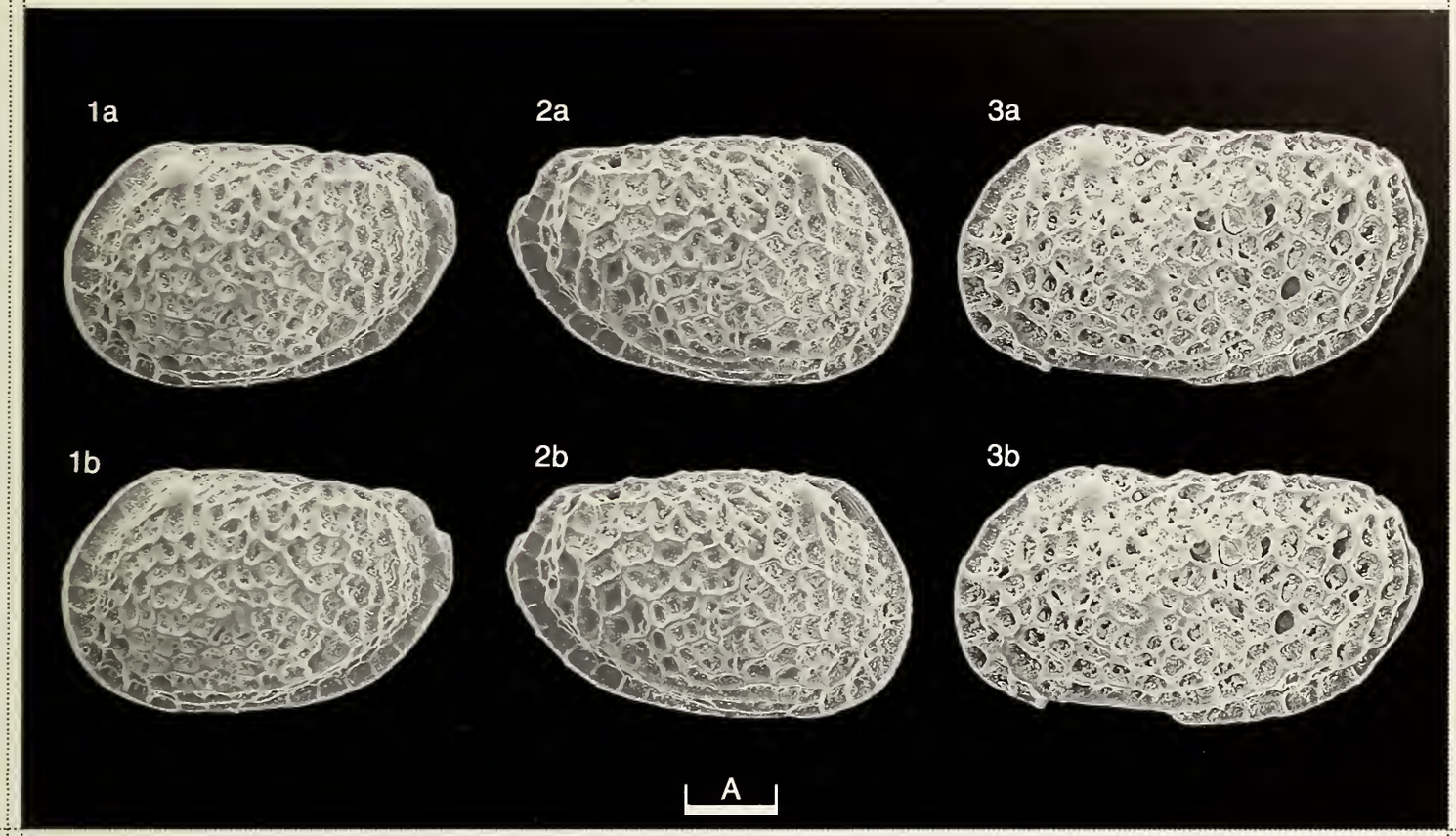
Fig. 1, ♀ LV, ext. lat. (holotype, **OS 14577**, 500 μm long); Fig. 2, ♀ RV, ext. lat. (paratype, **OS 14578**, 520 μm long); Fig. 3, ♂ LV, ext. lat. (paratype, **OS 14579**, 600 μm long).
Scale A (200 μm; ×107), figs. 1–3.

Remarks: The new species differs from the type, *Loxocorniculum fischeri* (Brady) (G.S. Brady *in* De Folin, L. & Périer, L. *Les Fonds de la Mer*, Paris, Savy, **1** (1), 154, pl. 18, figs. 15, 16, 1869), and most of the species assigned to *Loxocorniculum* in that the posterodorsal protuberance is less well defined.

Distribution: This species is known only from the two Apigné localities: Borehole II and Le Temple du Cerisier, NW France; Upper Pliocene, Redonian. See J.-P. Margerel (*op. cit.*) for further sample details.

Explanation of Plate 20, 104

Figs. 1–4, ♀ LV, (paratype, **OS 14580**, 550 μm long); fig. 1. int. lat.; fig. 2, post. hinge element; fig. 3. ant. hinge element; fig. 4, musc. sc.
Scale A (200 μm; ×107), fig. 1; scale B (25 μm; ×374), figs. 2, 3; scale C (25 μm; ×470), fig. 4.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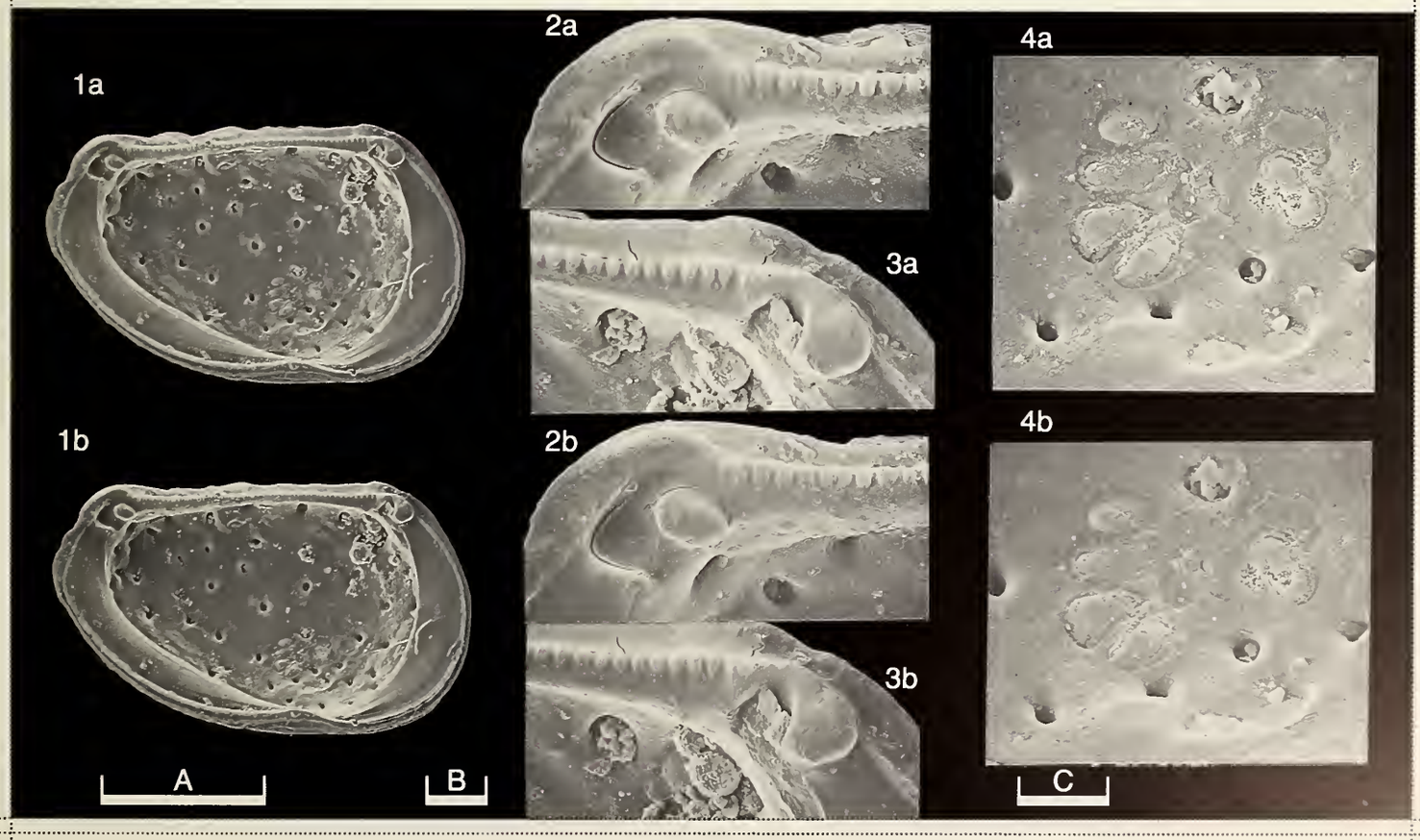
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4b
3b
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B
C

ON *TRACHYLEBERIS BATHYMARINA* AYRESS sp. nov.

by Michael A. Ayress
(Department of Geology, Australian National University, Canberra)

Trachyleberis bathymarina sp. nov.

Holotype: National Museum of Victoria, Melbourne, Australia, no. **P 197948**.

Type locality: Tasman Sea, Ocean Sciences Institute, University of Sydney core 1/86 6GC3, 90-91 cm, west Lord Howe Rise, present day water depth 1540 m. Latitude 32°58.8′S, longitude 159°59.9′E. Late Pleistocene foraminiferal ooze.

Derivation of name: Referring to the occurrence of this species in the deep-sea.

Figured specimens: National Museum of Victoria, Melbourne, Australia, nos. **P 197948** (holotype, ♂ LV: Pl. **20**, 106, figs. 1, 5), **P 197949** (paratype, ♂ RV: Pl. **20**, 106, figs. 2, 3), **P 197950** (paratype, ♀ LV: Pl. **20**, 106, figs. 1, 4), **P 197951** (paratype, ♀ RV: Pl. **20**, 108, figs. 2, 3); all from the type locality at core intervals 90–91 cm, 179–180 cm, 165–166 cm and 145–146 cm, respectively.

Diagnosis: An eyeless, weakly primarily and secondarily reticulate species of *Trachyleberis* with short complex, mostly conjunctive spines and a narrow ocular rib extending through compressed anterior region. Marginal rim dentate and bearing large conular tubercles. Subcentral tubercle weakly developed. Sexual dimorphism strong; females much shorter and more inflated than males.

Explanation of Plate 20, 106

Figs. 1, 5, ♂ LV (holotype, **P 197948**, 1310 μm long): fig. 1, ext. lat.; fig. 5, ext. surface detail. Figs. 2, 3, ♂ RV (**P 197949**, 1310 μm long); fig. 2, dors.; fig. 3, ext. lat. Fig. 4, ♀ RV, subcentral musc. sc. (**P 197951**, 1190 μm long).
Scale A (500 μm; ×50), figs. 1–3; scale B (100 μm; ×230), fig. 4; scale C (100 μm; ×175), fig. 5.

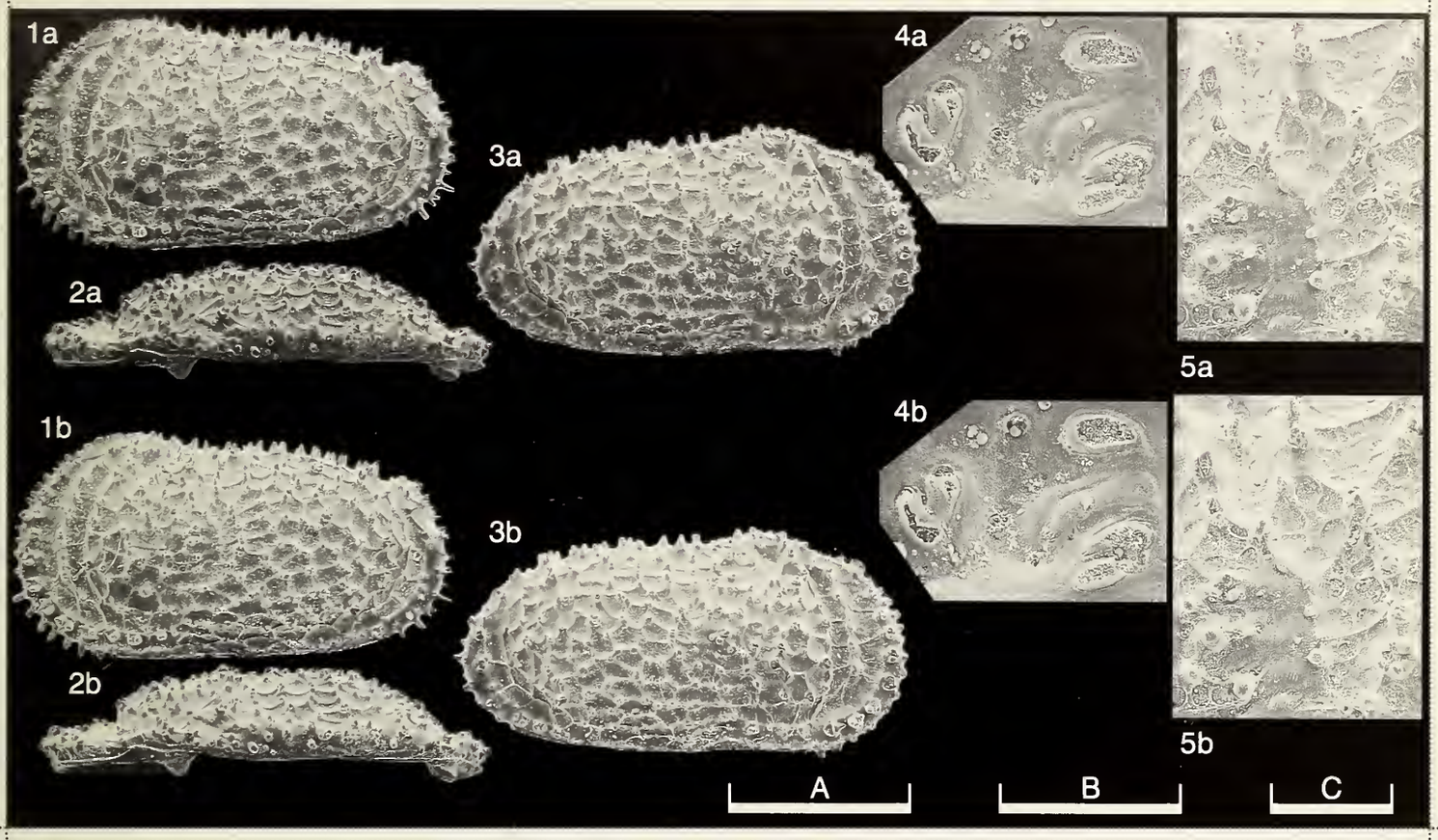
Remarks: Assigned to *Trachyleberis* on the basis of ornament, ocular rib and internal features. Nevertheless, it has a more rounded posterior margin and is more regularly spinose than is normal for the genus. In these respects it resembles *Henryhowella*, but it lacks the longitudinal ridges and well-developed subcentral tubercle characteristic of that genus and in addition has a distinct ocular rib, compressed anterior and a weak reticulation, features uncharacteristic of *Henryhowella*. Other similar spinose deep-sea genera, *Legitimocythere* and *Rugocythereis* (= *Pennyella*), differ in having a ventro-lateral spinose ridge in the former, and in the latter a much smaller, more subtriangular valve outline, mid-ventral snap-knob and a thicker postero-ventral marginal rim.

Distribution: Late Quaternary to Recent of the Tasman Sea, depths between 1340 and 2238 m; Chatham Rise, depths between 1204 and 3125 m, and Recent of the Kerguelen Ridge, depths between 915 and 3614 m.

Acknowledgement: I would like to thank the staff of the Electron Microscope Unit (ANU) for their assistance and Professor Whatley for critically reviewing the manuscript.

Explanation of Plate 20, 108

Figs. 1, 4, ♀ LV (**P 197950**, 1250 μm long): fig. 1, ext. lat.; fig. 4, int. lat. Figs. 2, 3, ♀RV (**P 197951**, 1190 μm long): fig. 2, ext. lat.; fig. 3, int. lat.
Scale A (100 μm; ×50), figs. 1–4.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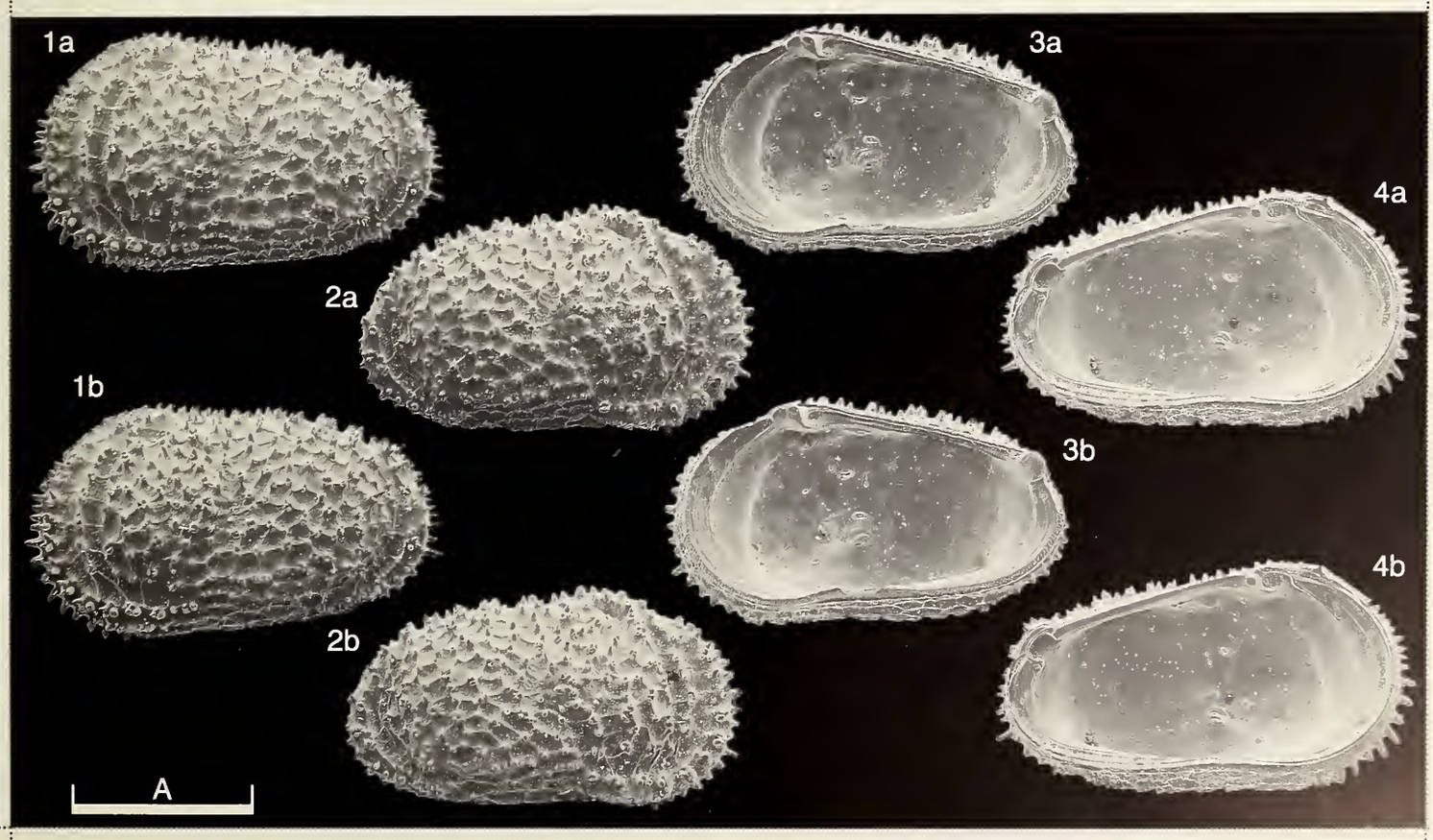
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595.336.12 (113.312) (82 : 164.070.31): 551.351 + 552.54

ON *PSEUDULRICHIA ALBRACA* SCHALLREUTER & LEHNERT sp. nov.

by Roger E.L. Schallreuter & Oliver Lehnert
(University of Hamburg & University of Erlangen-Nürnberg, Germany)

Pseudulrichia albraca sp. nov.

Holotype: Geologisch-Paläontologisches Institut und Museum, University of Hamburg, Germany (**GPIMH**), no. **3242c**; a right valve.
[Paratypes: **GPIMH** nos. **3242a–b, d–h**; **3243**].

Type locality: Quebrada Las Aquaditas. SW San José de Jáchal, San Juan Province, W Precordillera, Argentina, lat. 30°19′S, long. 69°10.5′W; *Pygodus anserinus* conodont zone. Las Aguaditas Formation, Llanvirn-Llandeilo, Ordovician.

Derivation of name: Artificial combination from Latin *altero bracchio carens*, one-armed; alluding to the reduced anterior spine in comparison to typical representatives of the genus.

Diagnosis: Valve length up to about 0.61 mm. Main sulcus (S_2) distinctly in front of mid-length and above mid-height. Anterior of S_2 there is a low node; posterior of S_2 and above mid-height there is a well developed posteriorly curved lobal spine.

Figured specimens: Geologisch-Paläontologisches Institut und Museum, University of Hamburg, nos. **GPIMH 3242a** (paratype, RV: Pl. **20**, 112, fig. 3), **3242b** (paratype, LV: Pl. **20**, 110, fig. 3), **3242c** (holotype, LV (Pl. **20**, 110, fig. 2), **3242e** (paratype, RV: Pl. **20**, 112, fig. 2), **3242f** (paratype, LV: Pl. **20**, 110, fig. 1) and **3242g** (RV: Pl. **20**, 112, fig. 1).

Explanation of Plate 20, 110

Fig. 1, LV ext. lat. (paratype, **GPIMH 3242f**, 0.41 mm long). Fig. 2, LV ext. lat. (holotype, **GPIMH 3242c**, 0.57 mm long). Fig. 3, LV ext. lat. (paratype, **GPIMH 3242b**, 0.45 mm long).
Scale A (100 μm; ×160), fig. 1; scale B (100 μm; ×110), fig. 2; scale C (100 μm; ×140), fig. 3.

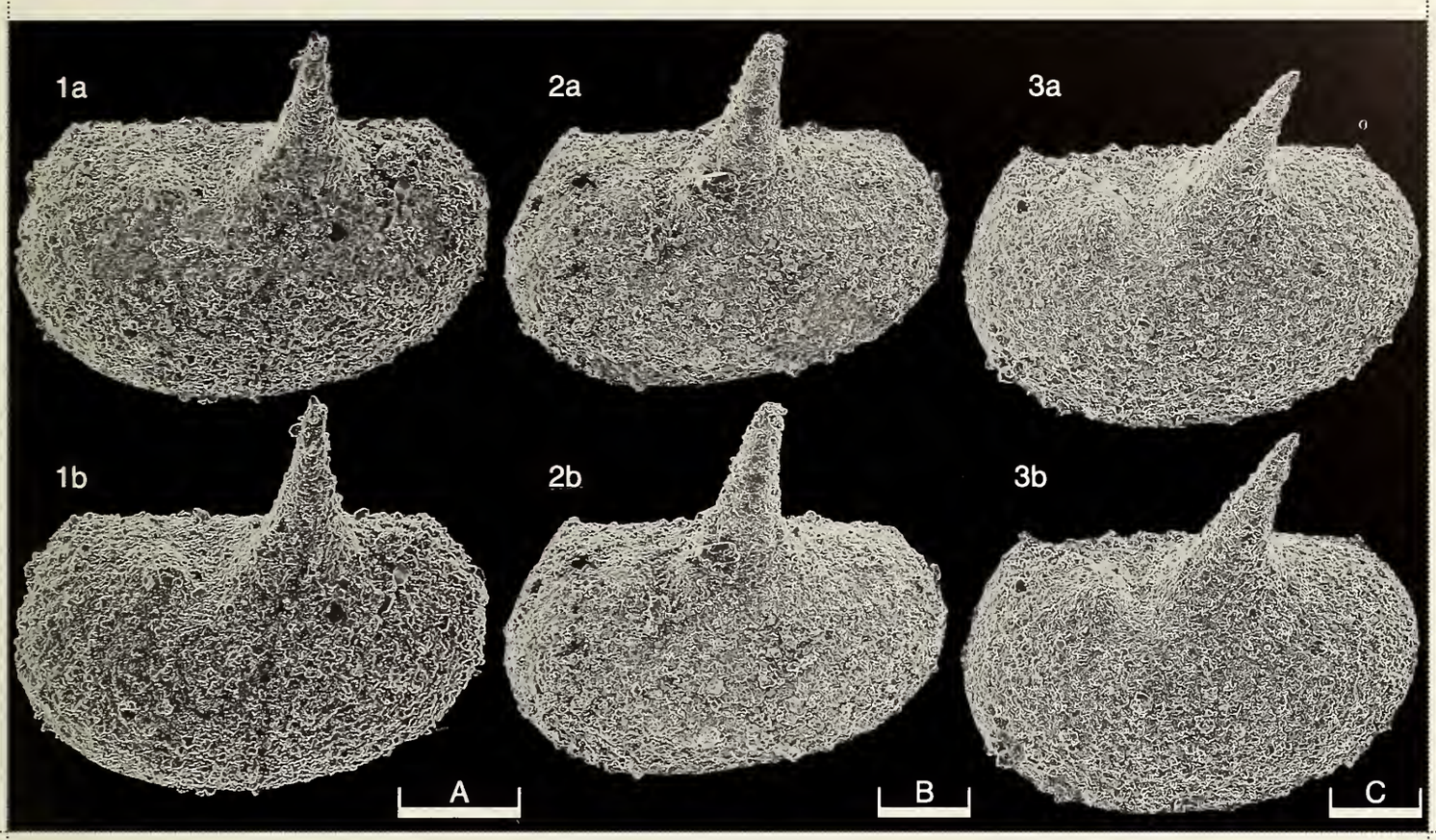
All of the figured specimens are silicified and are from the same sample (Lehnert SE-CON 51) as the holotype.

Remarks: The most morphologically similar of all published species of *Pseudulrichia* is *P. posterocerata* Blumenstengel (*Freiberger ForschHft.*, (C), **182**, 69, 1965) from the Upper Ordovician of Thuringia. *P. posterocerata* also possesses a weak anterior node and a strongly developed posterior spine. *P. albraca* is distinguished from that species by the more anterior position of its main sulcus S_2 and of the spine and node.

Distribution: Known only from type locality, Ordovician of Argentina.

Explanation of Plate 20, 112

Fig. 1, RV ext. lat. (**GPIMH 3242g**, 0.51 mm long). Fig. 2, RV ext. lat. (paratype, **GPIMH 3242e**, 0.54 mm long). Fig. 3, RV ext. lat. (paratype, **GPIMH 3242a**, 0.47 mm long).
Scale A (100 μm; ×120), figs. 1, 2; scale B (100 μm; ×140), fig. 3.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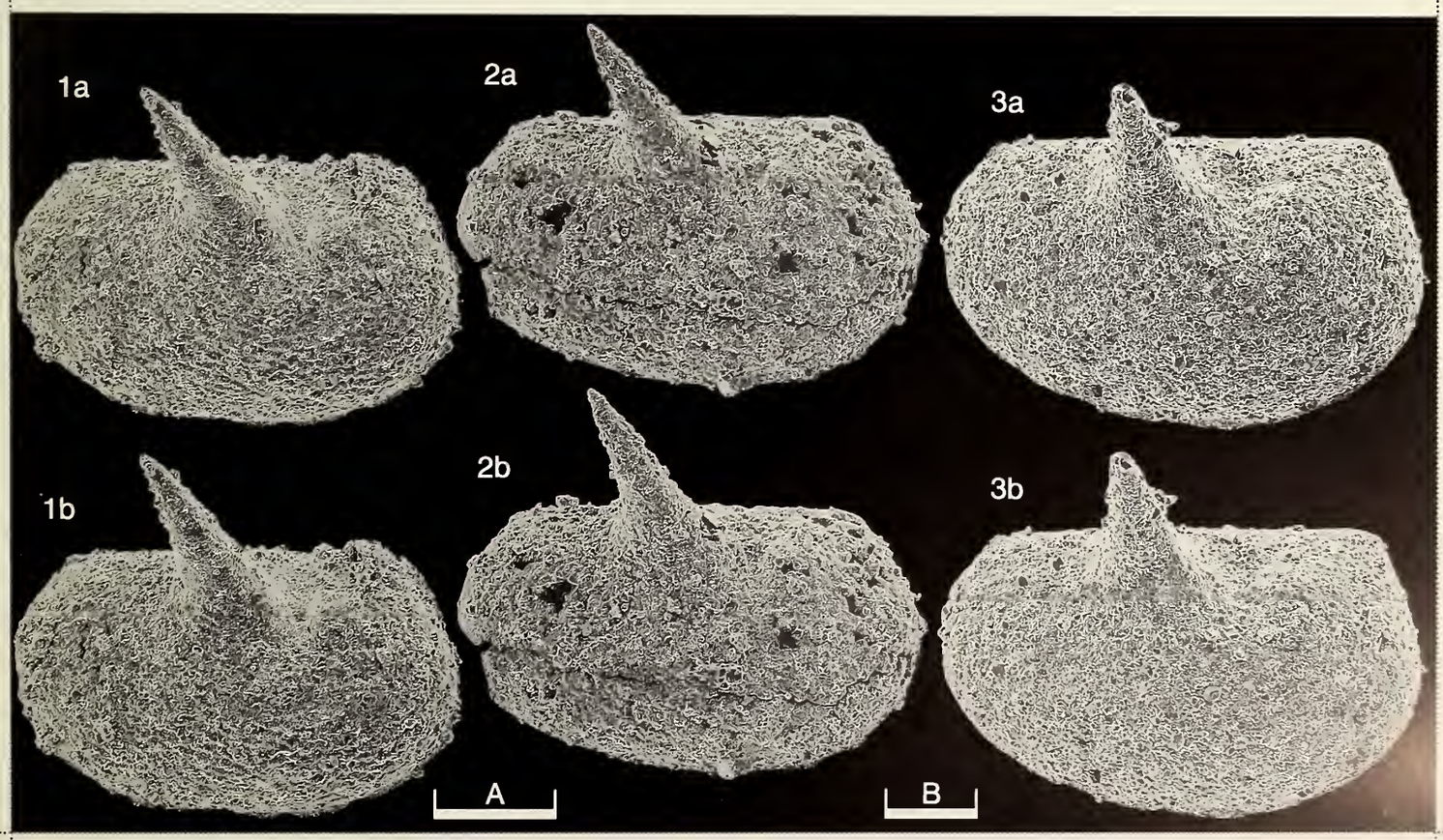
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595.336.12 (113.312) (82 : 164.070.31): 551.351 + 552.54

ON *LODESIA ADIASTOLA* SCHALLREUTER & LEHNERT gen. et sp. nov.

by Roger E.L. Schallreuter & Oliver Lehnert
(University of Hamburg & University of Erlangen-Nürnberg, Germany)

Genus *Lodesia* gen. nov.
Type species: *Lodesia adiastola* sp. nov.

Derivation of name: Anagram of the related *Delosia* Gailite, in which the lobes are similarly fused.

Diagnosis: Small genus. Distinctly in front of mid-length and above mid-height, near the dorsal border, there is a cone-like node, behind which there is a posteriorly curved spine. Node and spine are fused dorsally and are separated by a slit-like sulcus (S_2) in their ventral part.

Remarks: In having a strongly developed *Aechmina*-like spine and a slit-like S_2 positioned at the anteroventral part of the spine *Lodesia* resembles *Delosia* Gailite, 1967 (Gailite, L.K. 1967. Ostracodes. *In:* Gailite, L.K., Rybnikova, M.B. & Ulst, R.Z. *The Stratigraphy, fauna and conditions of deposition of the Silurian rocks of the central East Baltic*. Min. Geol. U.S.S.R., Inst. Geol. Zinatne, Riga). In the latter genus the spine is very stout, the S_2 is pit-like and a prominent pseudovelum is present (see Schallreuter, R.E.L., *Geol. Paläont. Westfalen*, **7**, 55, pl. 2, fig. 2b, 1987).

Explanation of Plate 20, 114

Fig. 1, LV ext. lat. (holotype, **GPIMH 3244a**, 494 μm long). Fig. 2, LV ext. lat. (paratype, **GPIMH 3244b**, 465 μm long). Fig. 3, LV ext. lat. (paratype, **GPIMH 3245**, 482 μm long).
Scale A (100 μm; ×135), figs. 1, 3; scale B (100 μm; ×140), fig. 2.

Lodesia adiastola sp. nov.

Holotype: Geologisch-Paläontologisches Institut und Museum, University of Hamburg (**GPIMH**), no. **3244a**; a left valve.
[Paratypes: **GPIMH** nos. **3244b–e, 3245**].

Type locality: Quebrada Las Aquaditas, SW San José de Jáchal, San Juan Province, W Precordillera, Argentina, lat. 30°19′S, long. 69°10.5′W; *Pygodus anserinus* conodont zone. Las Aguaditas Formation, Llanvirn-Llandeilo, Ordovician.

Derivation of name: From Greek *adiastolos*, confused; alluding to the dorsally fused node and spine.

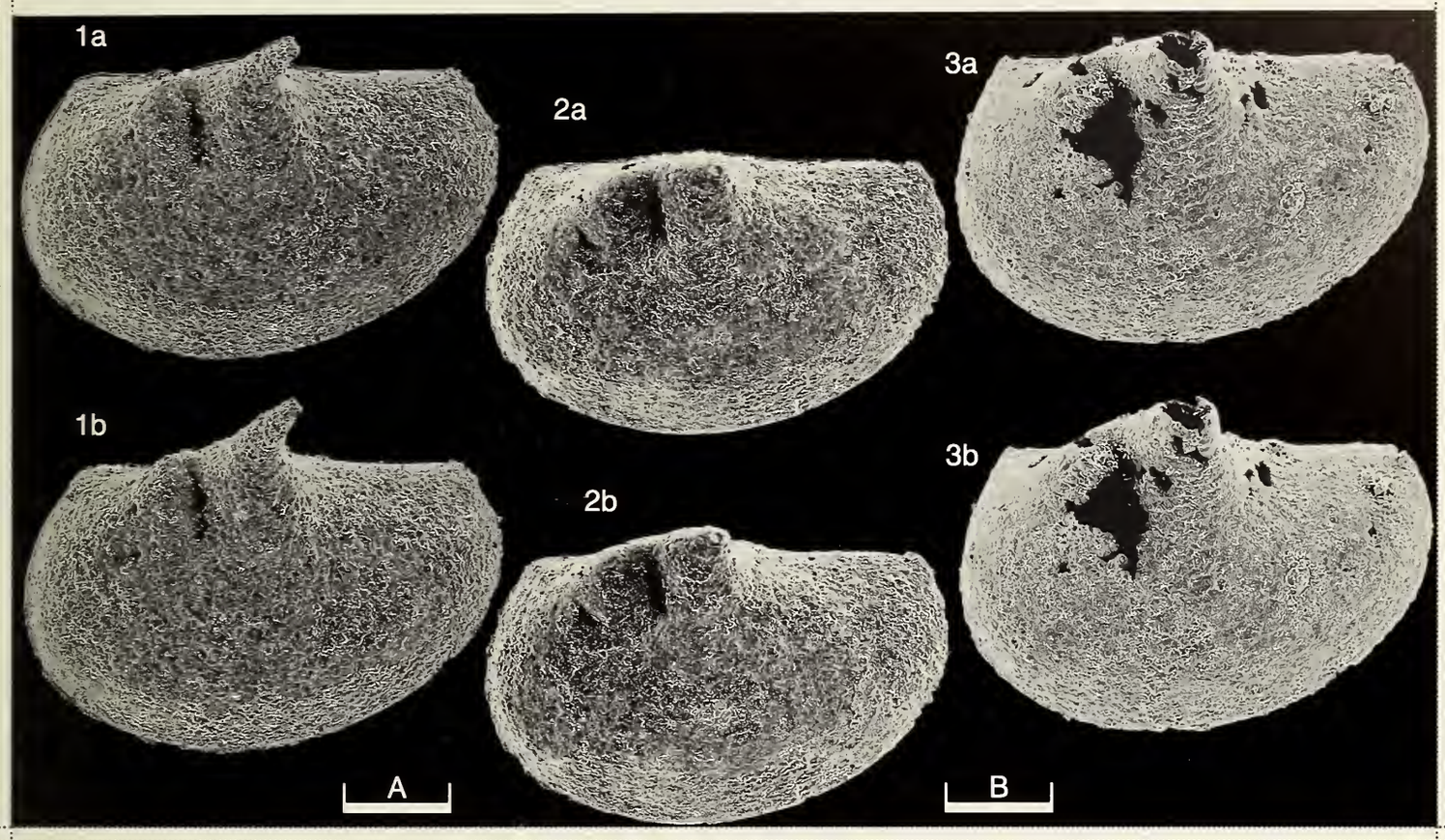
Diagnosis: As for the genus, which is currently monotypic.

Figured specimens: Geologisch-Paläontologisches Institut und Museum, University of Hamburg, nos. **GPIMH 3244a** (holotype, LV: Pl. **20**, 114, fig. 1), **3244b** (paratype, LV: Pl. **20**, 114, fig. 2), **3244c** (paratype, LV Pl. **20**, 116, fig. 1), **3244d** (paratype, LV: Pl. **20**, 116, fig. 2), **3244e** (paratype, RV: Pl. **20**, 116, fig. 3) and **3245** (LV: Pl. **20**, 114, fig. 3).
All of the figured specimens are from the same sample (Lehnert SE-CON 160) as the holotype. The material is silicified. Ostracod associates include *Trispinatia rusconii* (de García & Proserpio, 1978) and *Reginea*? *jaanussoni* (de García & Proserpio, 1978).

Distribution: Known only from type locality, Ordovician of Argentina.

Explanation of Plate 20, 116

Fig. 1, LV ext. lat. (paratype, **GPIMH 3244c**, 445 μm long). Fig. 2, LV ext. lat. (paratype, **GPIMH 3244d**, 445 μm long). Fig. 3, RV ext. lat. (paratype, **GPIMH 3244e**, 433 μm long).
Scale A (100 μm; ×150), fig. 1; scale B (100 μm; ×135), fig. 2; scale C (100 μm; ×155), fig. 3.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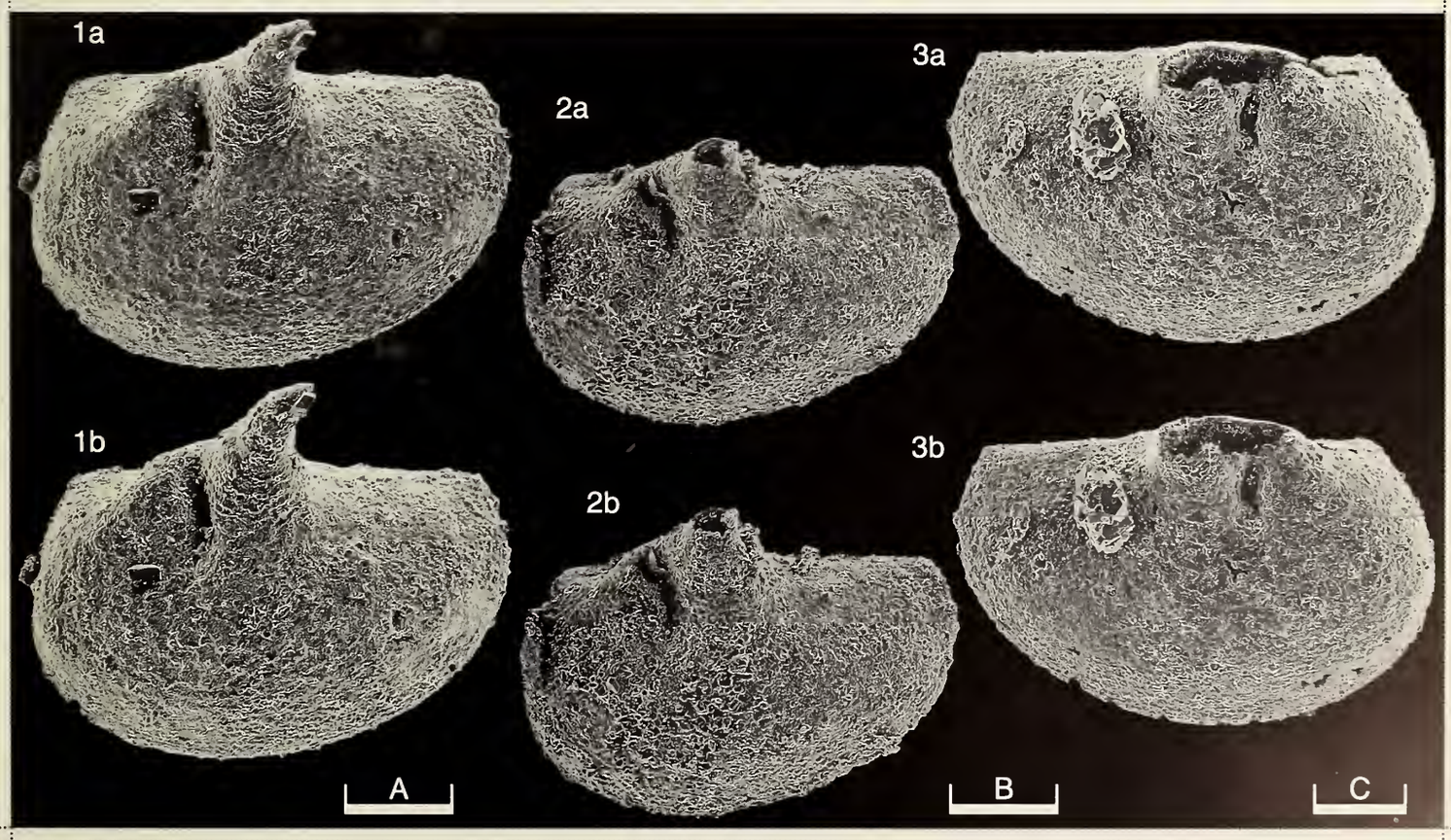
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C

Stereo-Atlas of Ostracod Shells 20 (28) 117–120 **(1993)**
595.336.12 (113.311) (941 : 163.125.19): 551.351

ON *EOPILLA INGELORAE* SCHALLREUTER gen. et sp. nov.

by Roger E.L. Schallreuter
(University of Hamburg, Germany)

Genus *Eopilla* gen. nov.
Type species: *Eopilla ingelorae* sp. nov.

Derivation of name: *Eo* + *pilla*; the genus is considered to be an ancestor of *Pilla* Schallreuter & Siveter (*Stereo-Atlas Ostracod Shells* **15**, 25–28, 1988).

Diagnosis: Small to medium-sized Pillinae. Quadrilobate; L_1 and L_3 more strongly developed than L_2 and L_4. L_2 long to very short (= preadductorial node-like). Lobes broad to narrow, in some cases crista-like. Lobes connected ventrally.

Remarks: This genus is distinguished from the other genera of the subfamily Pillinae by the development of a distinct fourth lobe (L_4) in the posterior part of the valve.

Eopilla ingelorae sp. nov.

Holotype: Commonwealth Palaeontological Collections, Australian Geological Survey, Canberra, A.C.T., Australia (**CPC**), no. **23569**; a left valve.
[Paratypes: **CPC** nos. **23570–23574**].

Type locality: Type section of the Emanuel Formation at Prices Creek, northern Western Australia; lat. 18°35′48″S, long. 125°53′00″E. Lower Emanuel Formation, upper Tremadoc, lower Ordovician.

Explanation of Plate 20, 118

Fig. 1, LV ext. lat. (holotype, **CPC 23569**, 0.78 mm long). Fig. 2, dorsally incomplete RV ext. lat. (paratype, **CPC 23570**, 0.83 mm long). Fig. 3, juv. LV ext. lat. (paratype, **CPC 23571**, 0.69 mm long).
Scale A (100 μm; ×100), fig. 1; scale B (100 μm; ×75), fig. 2; scale C (100 μm; ×85), fig. 3.

Derivation of name: In honour of Dr Ingelore Hinz-Schallreuter for her help in Canberra in 1991.

Diagnosis: Valve length up to about 0.90 mm. Lobes narrow, of crista-like appearance; may protrude very slightly over the hinge-line. L_2 narrow and long. Connecting lobe weak to virtually obsolete.

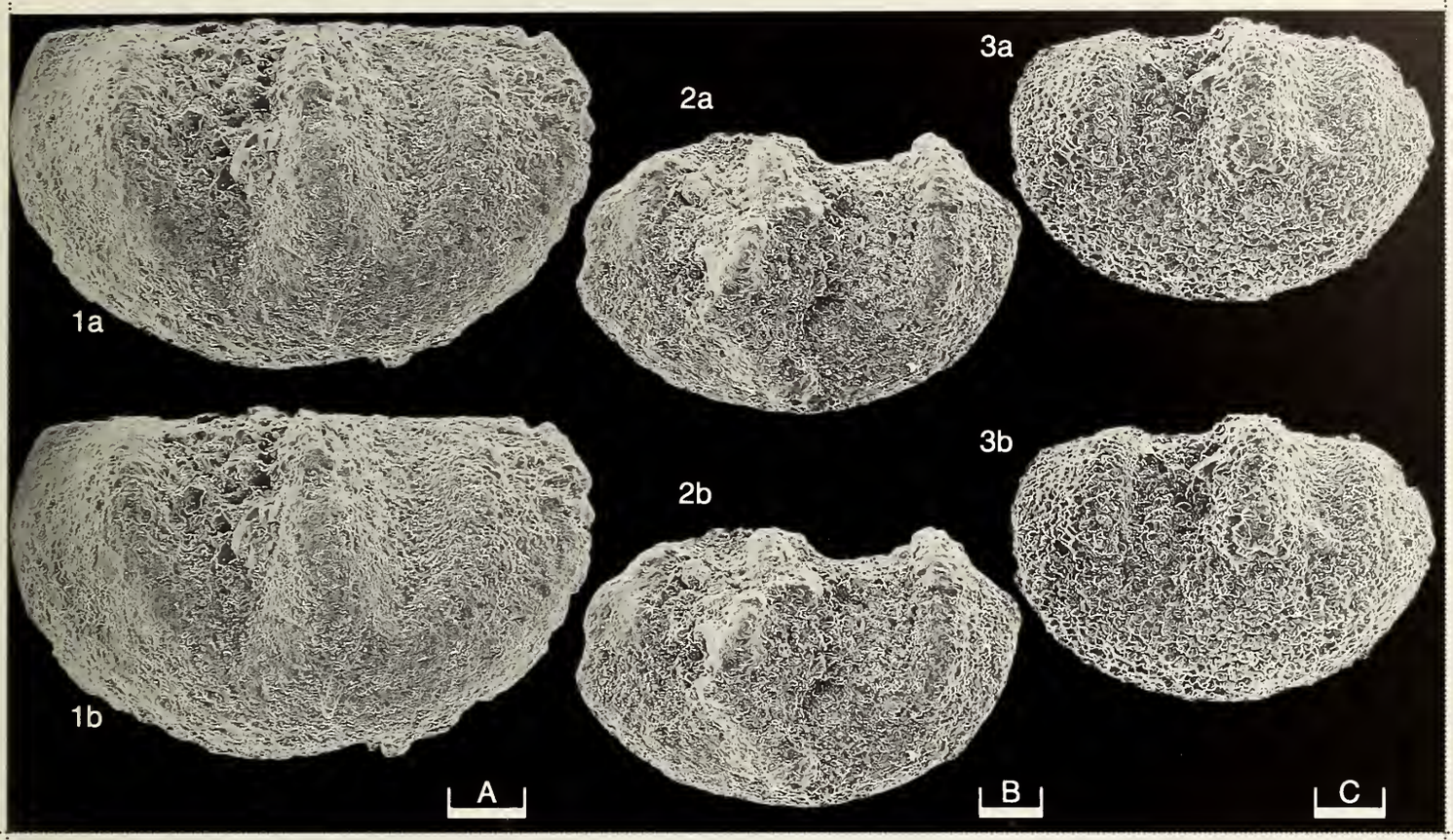
Figured specimens: Commonwealth Palaeontological Collections, Australian Geological Survey, Canberra, nos. **CPC 23569** (holotype, LV: Pl. **20**, 118, fig. 1), **23570** (paratype, dorsally incomplete RV: Pl. **20**, 118, fig. 2), **23571** (paratype, LV Pl. **20**, 118, fig. 3), **23572** (paratype, anterodorsally incomplete RV: Pl. **20**, 120, fig. 1), **23573** (paratype, LV: Pl. **20**, 120, fig. 2) and **23574** (posterodorsally incomplete RV: Pl. **20**, 120, fig. 3).
All of the figured specimens are from the same sample (WCB 705/46) as the holotype.

Remarks: *Eopilla ingelorae* is the oldest known Australian Ordovician ostracod. The Chinese species *Eopilla sinensis*, *E. sinensis wangi* and *E. taitzehoensis* Hou (*Acta palaeont. sin.*, **1**, 40–50, 1953), all of which may be synonyms of each other, are characterized by having much broader lobes and a shorter L_2 which forms a preadductorial node.

Distribution: Known only from the lower Emanuel Formation, upper Tremadoc, at the type locality (samples WCB 705/46–69).

Explanation of Plate 20, 120

Fig. 1, anterodorsally incomplete juv. RV ext. lat. (paratype, **CPC 23572**, 0.52 mm long). Fig. 2, LV ext. lat. (paratype, **CPC 23573**, 0.73 mm long). Fig. 3, posterodorsally incomplete RV ext. lat. (paratype, **CPC 23574**, 0.71 mm long).
Scale A (100 μm; ×140), fig. 1; scale B (100 μm; ×100), fig. 2; scale C (100 μm; ×85), fig. 3.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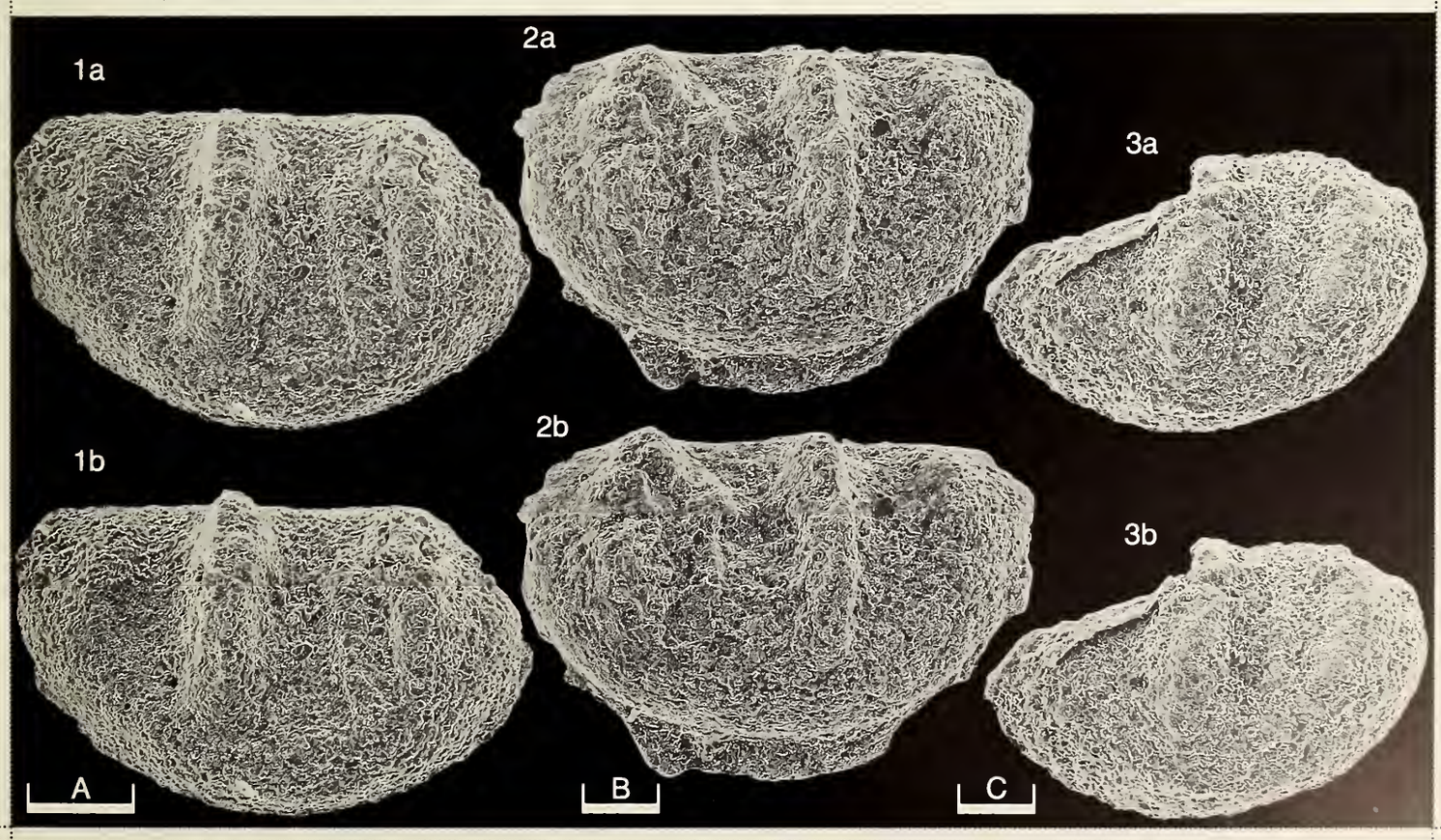
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ON *EODOMININA NUELA* SCHALLREUTER gen. et sp. nov.

by Roger E.L. Schallreuter
(University of Hamburg, Germany)

Genus *Eodominina* gen. nov.
Type species: *Eodominina nuela* sp. nov.

Derivation of name: From Greek *Eos*, early; the genus is considered to be an ancestor of *Dominina* Burrett & Laurie (*in* Burrett *et al.*, *Mem. australas. Palaeontol.*, **1**, 191, 1983).

Diagnosis: Small to medium-sized. Two prominent lobes, one in front and one behind S_2; both occur mainly in dorsal half of valve and are connected in ventral half; each lobe is dorsally bulb- to spine-like. Tiny preadductorial node. No pseudovelum.

Remarks: In contrast to *Webbylla* and *Pilla* (both Schallreuter & Siveter; see *Stereo-Atlas Ostracod Shells*, **15**, 17–28, 1988), *Eodominina*, like *Dominina*, lacks a lobe-like pseudovelum. *Dominina* is distinguished from *Eodominina* mainly by the development of a prominent, discreet bulb at the dorsal margin between the two main lobes. *Endominina* is possibly a synonym of the poorly documented *Sinoprimitia* Hou (*Acta palaeont. sin.*, **1**, 77, 1953) from the lower Ordovician of Hupeh, China. The latter genus also possesses two rounded dorsal nodes but no other taxonomically important features are known.

Explanation of Plate 20, 122

Fig. 1, car. ext. lt. lat. (holotype, **CPC 23575**, 0.86 mm long). Fig. 2, RV ext. lat. (paratype, **CPC 23578**, 0.79 mm long). Fig. 3, car. ext. vent. (**CPC 23577**, 0.70 mm long).
Scale A (100 μm; $\times$90), fig. 1; scale B (100 μm; $\times$95), fig. 2; scale C (100 μm; $\times$75), fig. 3.

The main anterior lobe of *Eodominina* is considered to be L_1 and the small low node immediately behind it (Pl. **20**, 124, fig. 3) is interpreted as a preadductorial node (L_2). Moreover, if *Dominina* originates from *Eodominina*, the main posterior lobe of the latter must be considered as equivalent to L_4 because in *Dominina* L_3 is developed as a prominent bulb.

Eodominina nuela sp. nov.

Holotype: Commonwealth Palaeontological Collections, Australian Geological Survey, Canberra, A.C.T., Australia (**CPC**), no. **23575**; a carapace.
[Paratypes: **CPC** nos. **23576–23578** and Geologisch-Paläontologisches Institut und Museum, University of Hamburg (**GPIMH**) no. **3247**.]

Type locality: Type section of the Emanuel Formation at Prices Creek, northern Western Australia; lat. 18°35′48″S, long. 125°53′00″E. Upper Emanuel Formation, lower Arenig, lower Ordovician.

Derivation of name: After its occurrence in the upper Ema*nuel* Formation.

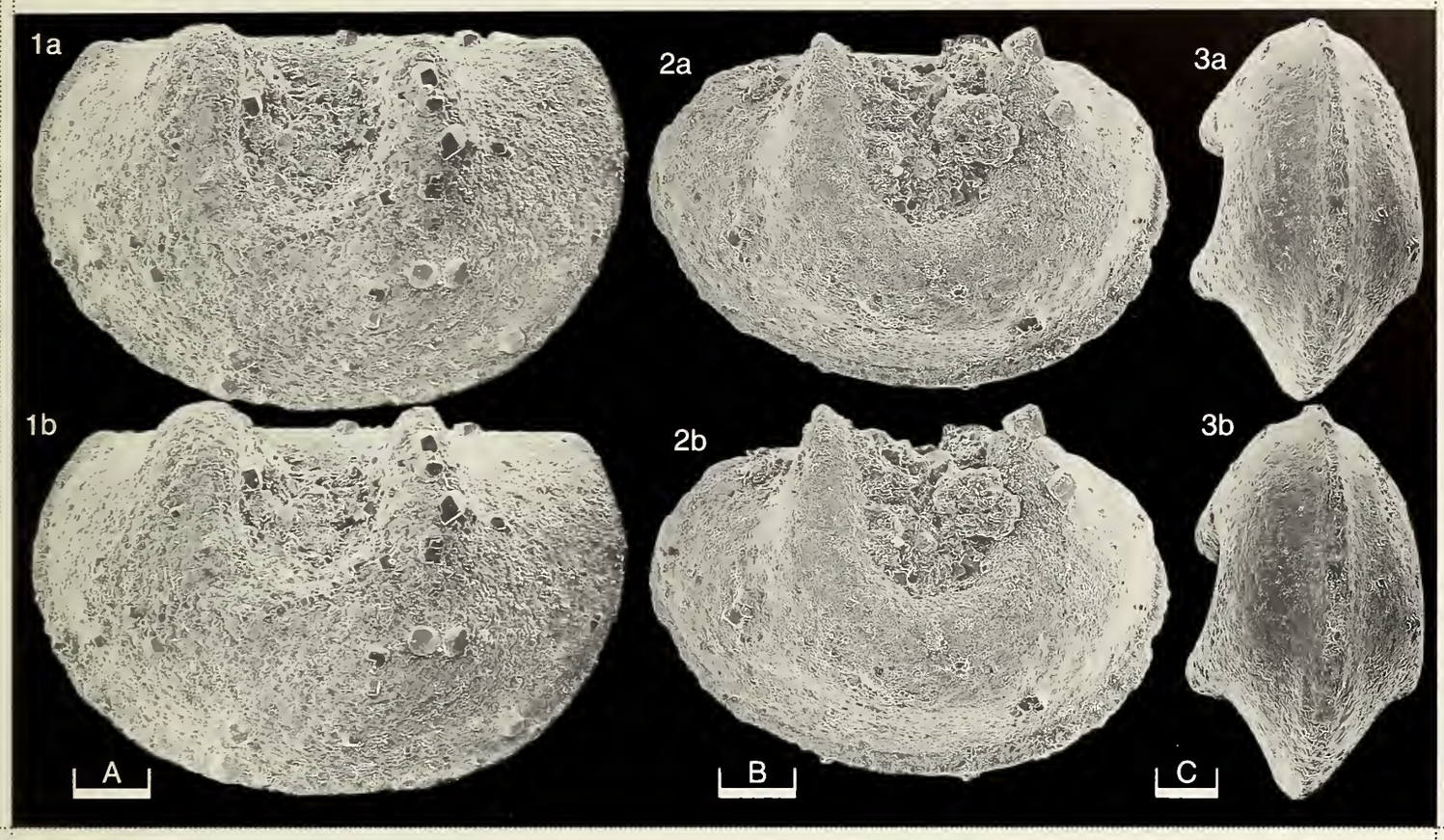
Diagnosis: Valves up to about 1.10 mm long. Lobes relatively narrow, dorsally spine-like, characteristically protruding over the hinge-line in lateral view, the posterior more so than the anterior lobe.

Figured specimens: Commonwealth Palaeontological Collections, Australian Geological Survey, Canberra, nos. **CPC 23575** (holotype, car.: Pl. **20**, 122, fig. 1), **23576** (paratype, car.: Pl. **20**, 124, fig. 2), **23577** (paratype, car.: Pl. **20**, 122, fig. 3; Pl. **20**, 124, fig. 3), **23578** (paratype, RV: Pl. **20**, 122, fig. 2). Geologisch-Paläontologisches Institut und Museum, University of Hamburg **GPIMH 3247** (paratype car.: Pl. **20**, 124, fig. 1).
All of the specimens are from the same sample (WCB 705/249) as the holotype.

Distribution: Known only from the upper Emanuel Formation, lower Arenig, at type locality (samples WCB 705/229–250).

Explanation of Plate 20, 124

Fig. 1, car. ext. rt. lat. (paratype, **GPIMH 3247**, 0.86 mm long). Fig. 2, car. ext. rt. lat. (paratype, **CPC 23576**, 0.71 mm long). Fig. 3, car. ext. dors. (paratype, **CPC 23577**).
Scale A (100 μm; $\times$105), figs. 1, 2; scale B (100 μm; $\times$75), fig. 3.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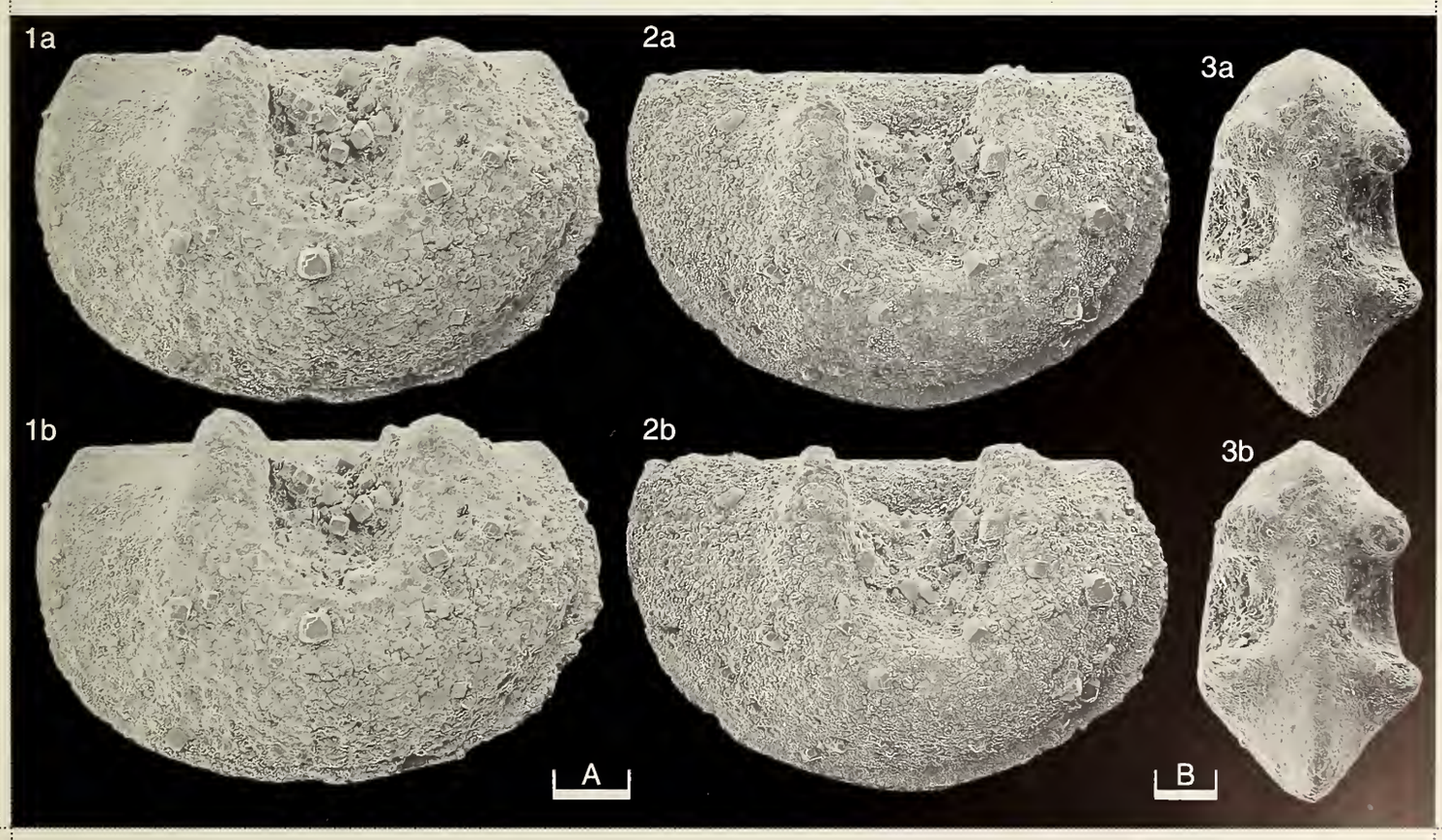
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Index; Geographical Location

See **1** (1) 5-22 (**1973**) for explanation of the Schedules in the Universal Decimal Classification

Stereo-Atlas of Ostracod Shells: Vol. 20, Part 2

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